5-4120-378-14

TM 5-4120-378-14

TECHNICAL MANUAL

OPERATOR'S ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

AIR CONDITIONER
HORIZONTAL, COMPACT,
9,000 BTU/HR,
115 VOLT
SINGLE PHASE
50/60 HERTZ

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OPERATING INSTRUCTIONS 2-1

OPERATOR'S MAINTENANCE INSTRUCTIONS 3-1

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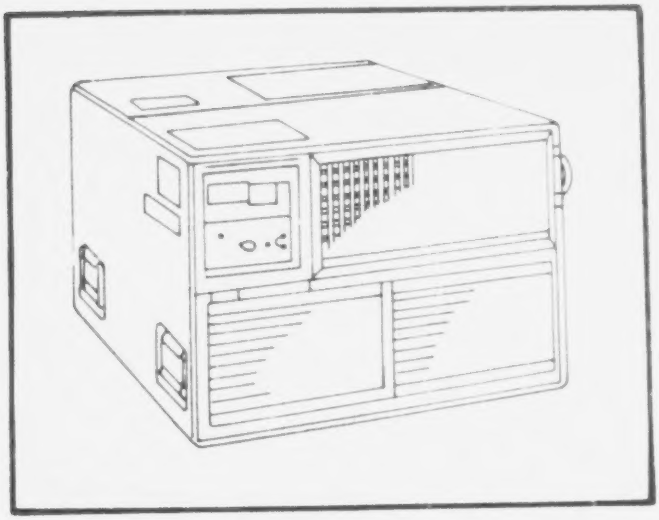

MODEL A9KH-115P
NSN 4120-01-136-2214

HEADQUARTERS, DEPARTMENT OF THE ARMY

31 OCTOBER 1986

READEX FICHE best copy available

D 101 11:

WARNING

Notices in this manual must be obeyed by all personnel. Failure to do so can result in serious injury, or death.

WARNING

Do not use steam, open flame, heat gun, or any other high temperature source to thaw an iced coil. Thaw an iced coil by operating unit in high heat mode, or by leaving unit shut down until ice melts.

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (2.1 kg/cm^2). Do not direct compressed air against skin. Use goggles or full face shield.

WARNING

Avoid inhaling fumes from acid formed by burn out of oil and refrigerant. Wear gas mask if area is not thoroughly ventilated. Wear protective goggles or glasses to protect eyes. Wear rubber gloves to protect hands. Use care to avoid spilling compressor burn out sludge. If sludge is spilled, clean area thoroughly.

WARNING

Clean parts in well ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly. Dry cleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).

WARNING

DEATH ON CONTACT or severe injury may result if personnel fail to observe safety precautions. Always disconnect the air conditioner from power source before performing maintenance on this equipment. If power must remain on for troubleshooting, exercise extreme care to avoid contact with any electrical component, fan, fan motor, etc.

WARNING

Whenever possible, input power supply to the equipment must be shut off before beginning work. Take particular care to ground every capacitor likely to hold a dangerous potential charge. When working inside after power has been turned off always ground every part before touching it.

WARNING

Do not operate equipment without all grilles, guards, louvers, and covers in place and tightly secured.

WARNING

The burning of polyurethane foam is dangerous. Due to the chemical composition of a polyurethane foam, toxic fumes are released when it is burned or heated. If it is burned or heated indoors, such as during a welding operation in its proximity, precautions should be taken to adequately ventilate the area. An exhaust system equivalent to that of a paint spray booth should be used. Air supply respirators, approved by the National Institute for Occupational Safety and Health or U.S. Bureau of Mines should be used for all welding in confined spaces and when ventilation is inadequate.

WARNING

DEATH or severe injury may result if personnel fail to observe safety precautions. Never use a heating torch on any part that contains Refrigerant-22. Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas.

TECHNICAL MANUAL

NO. 5-4120-378-14

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 31 October 1986

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

FOR

AIR CONDITIONER, HORIZONTAL, COMPACT
9,000 BTU/HR,
115V, 50/60 HERTZ, SINGLE-PHASE,
MODEL A9KH-115P

(NSN 4120-01-136-2214)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistake or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, U.S. Army Troop Support Command, ATTN: AMSTR-MCTS, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. A reply will be furnished directly to you.

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CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE

Type of Manual: Operator's Organizational, Direct and General Support Maintenance.

Model Number and Equipment Name: A9KH-115P Air Conditioner, Compact, Horizontal, 9,000 BTU/HR, 115 Volt, Single Phase, 50/60 Hertz.

Purpose of Equipment: Provide filtered, cooled or heated air to a desired range and circulate the air to provide cooling or heating of equipment or personnel within the area.

1-2 MAINTENANCE FORMS AND RECORDS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System (TAMMS).

1-3 DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE

Refer to TM 750-244-3, Procedures for Destruction of Equipment to Prevent Enemy Use, for information about destruction.

1-4 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRs)

If your air conditioner needs improvement let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Tell us why a procedure is hard to perform. Put it on an SF 368 (Quality Deficiency Report). Mail it directly to Commander, U.S. Army Troop Support Command, ATTN: AMSTR-QX, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. A reply will be furnished directly to you.

1-5 LIST OF ABBREVIATIONS

a	ampere
BTU/HR	British Thermal units per hour
C	celsius
COMPR	compressor
DB	dry bulb
F	fahrenheit
hp	horsepower
in	inch
kg	kilogram
kg/m^2	kilogram per square meter
kg/cm^2	kilogram per square centimeter
l	liter
lb	pound
OD	outside diameter
psi	pounds force per square inch
psig	pounds force per square gage
pt	pint
rpm	revolutions per minute
SHR	sensible heat ratio
v	volts
vac	volts alternating current
vdc	volts direct current

Section II. EQUIPMENT DESCRIPTION

1-6. PURPOSE OF AIR CONDITIONER

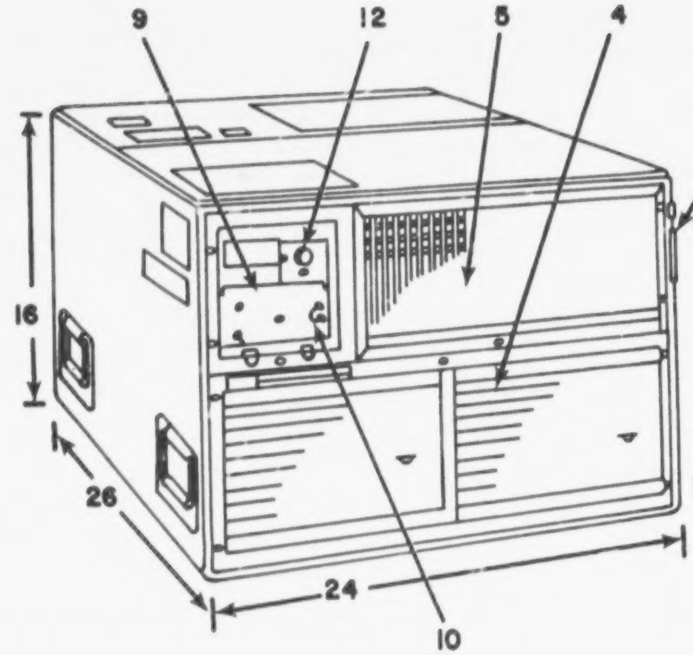
The air conditioner is used primarily in van type enclosures to provide filtered, cooled or heated air, as required to maintain the service conditions necessary for the efficient operation of electronic equipment in the vans. The air conditioner also provides for the comfort of operating personnel housed within the vans.

Capabilities and Features:

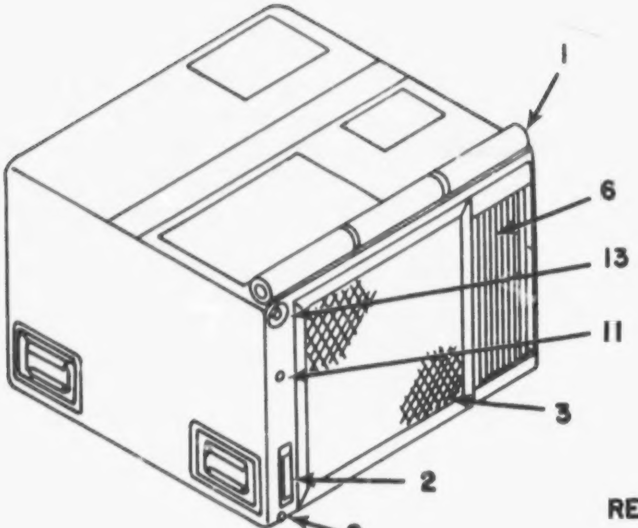
Light-weight, compact, horizontal.
Floor-mounted and air-cooled.
Electric motor driven and designed for continuous operation under varying loads.
Furnishes 10,000 BTU/HR for cooling; 7,000 BTU/HR for heating.
Handles for lifting.
Auxiliary power input source (J11).
Roll-up condenser cover.

1-7. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

1.	Canvas Cover	• Protects condenser coil from extreme cold temperatures during winter months.
2.	Fresh Air Screen	• Filters fresh(make-up) air for evaporator compartment.
3.	Condenser Guard	• Protects condenser from external damage.
4.	Evaporator, Inlet Louver	• Horizontal adjustable louver. • Directs room air into air conditioner for filtering and recycling.
5.	Evaporator, Outlet Louver	• Vertical and horizontal louvers. • Individually hand adjustable. • Directs conditioned air into room.
6.	Condenser Louver	• Directs air exhaust from condenser for minimizing over-heating.
7.	Ventilation Actuator	• Opens and closes fresh air inlet passage.
8.	Drain Tubes	• Allow discharge of condensate during operation.
9.	Control Module Panel	• Contains operator control switches. • Includes compressor circuit breaker.
10.	Compressor Circuit Breaker	• Protects compressor from electrical current overload.
11.	Liquid Sight Indicator	• Indicates condition and level of refrigerant.
12.	Main Power Connector	• For connections to 115 volt, 50/60 Hz, single-phase power source.
13.	Auxiliary Power Input Connector	• Provides auxiliary power input.


9
12
5
4
7
16
26
24
10

FRONT VIEW



REAR VIEW

1-8. PERFORMANCE DATA

The following listing contains the performance and dimensional data applicable to the air conditioner:

a. Air Conditioner Model A9KH-115P:

Nomenclature	Air Conditioner, Horizontal, Compact, 9,000 BTU/HR, 115 Volt, Single Phase, 50/60 Hertz.
Manufacturer	A. R. E. Manufacturing Co., Inc.
Capacity:	
Cooling	10,000 BTU/HR
Heating	7,000 BTU/HR
Phase	Single
Hertz	50/60
A/C Volts	115
Current input, full load, amperes:	
Cooling	33 (maximum)
High Heat	20 (maximum)
Low Heat	12 (maximum)
Ventilating	5 (maximum)
Refrigerant	R22
Amount of Charge	2.1875 lbs. (.98 kg)

b. Dimensions and Weight

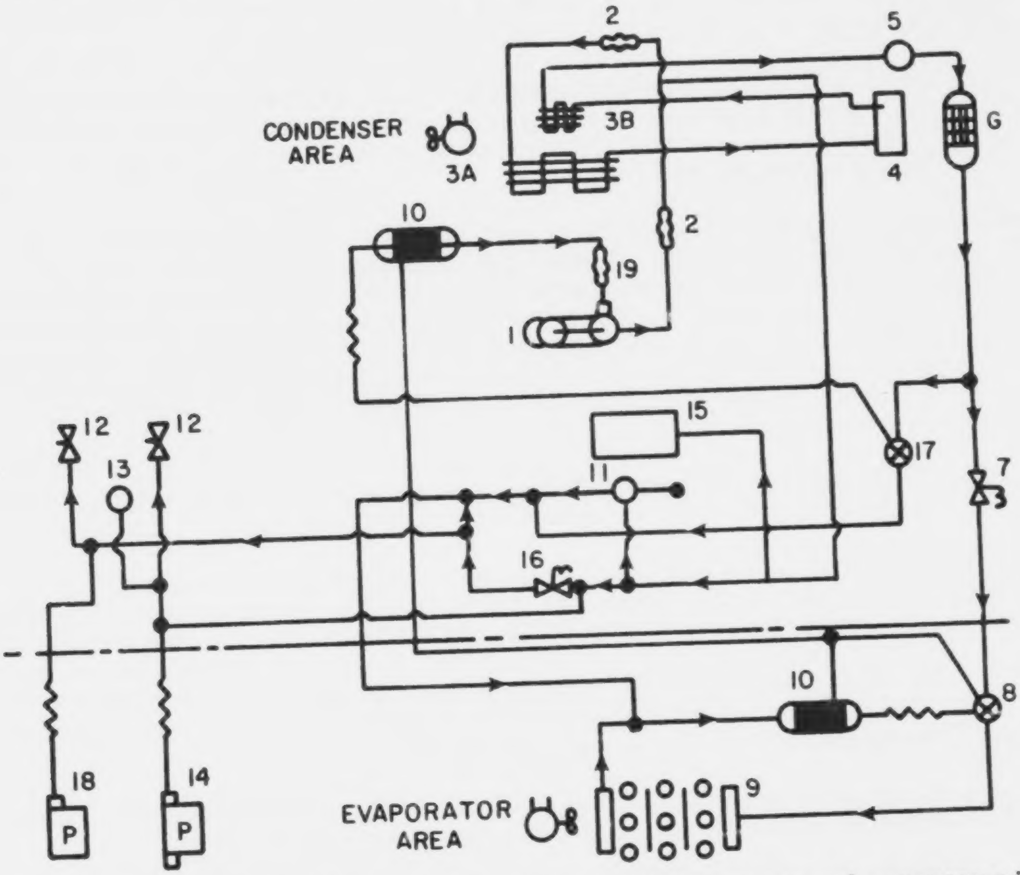
Length	26 inches (66.04 cm)
Height	16 inches (40.64 cm)
Width	23 3/4 inches (60.33 cm)
Weight	200 pounds (90.80 kg) (maximum)

c. Normal Operating Temperature Range -50^{o}F to $+125^{o}$F

Section III. TECHNICAL PRINCIPLES OF OPERATION

1-9. REFRIGERATION CYCLE

a. The Refrigeration Cycle. The refrigeration system removes heat from a given area.


2
5
CONDENSER AREA
3B
G
3A
4
10
2
19
1
15
12
12
13
11
17
7
16
10
8
18
14
P
P
EVAPORATOR AREA
9

(1) The compressor (1) takes cold, low pressure refrigerant gas and compresses it to a high temperature, high pressure gas. This gas flows through the copper tubing and metal hose assy (2) to the condenser coil (3A) and receiver (4).

(2) The condenser fan draws outside ambient air over and through the condenser coil (3A). The high temperature, high pressure gas from the compressor (1) is cooled by the flow of air and is changed into a high pressure liquid.

(3) The sight indicator (5) indicates the presence of moisture and quantity of refrigerant in the system.

1-9. REFRIGERATION CYCLE - Continued

(4) The dehydrator (6) removes any moisture (water vapor) or dirt that may be carried by the liquid refrigerant.

(5) The solenoid valve (7) is controlled by the temperature selector on the control panel. This valve will shut off the flow of refrigerant to the evaporator section when the temperature in the conditioned area reaches the set point.

(6) The expansion valve (8) senses the temperature and pressure of the refrigerant as it leaves the evaporator coil. By use of the feeler bulb in the bulb well (10) and "external equalizer line" the valve constantly adjusts the flow of liquid refrigerant to the evaporator coil (9).

(7) As the high pressure liquid refrigerant leaves the expansion valve (8), it enters the evaporator coil (9). As the liquid enters the coil, due to the size difference between the coil and the tubing, the pressure is suddenly decreased. As the pressure decreases, the liquid refrigerant "flashes" to a gas. The evaporator blower circulates the warm air from the conditioned space over and through the evaporator coil (9). Liquid refrigerant absorbs heat when it changes from a liquid to a gas. As the air from the conditioned spaces comes in contact with the evaporator coil (9), the air is cooled.

(8) To prevent compressor damage during start-up, solenoid valve (16) is normally open to equalize pressure on both sides of the compressor.

b. Bypass System. This unit has a bypass system which allows cooling operation at low cooling loads without cycling the compressor on and off. In bypass, the refrigerant flow is from the discharge to the suction of the compressor, bypassing the evaporator coil (9).

(1) When the temperature selector on the control panel senses that cooling conditions have reached the set point, it closes the solenoid valve (7) to shut off refrigerant flow to the evaporator coil (9).

(2) As the compressor suction pressure starts to drop, the pressure regulator (11) opens to allow flow of hot gas from the compressor.

(3) The quench valve (17) senses the temperature of the gas at the suction side of the compressor. To prevent excessively hot gas from reaching the compressor, the quench valve (17) opens to allow liquid refrigerant to mix with the hot gas.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. DESCRIPTION AND USE OF CONTROLS

2-1. GENERAL

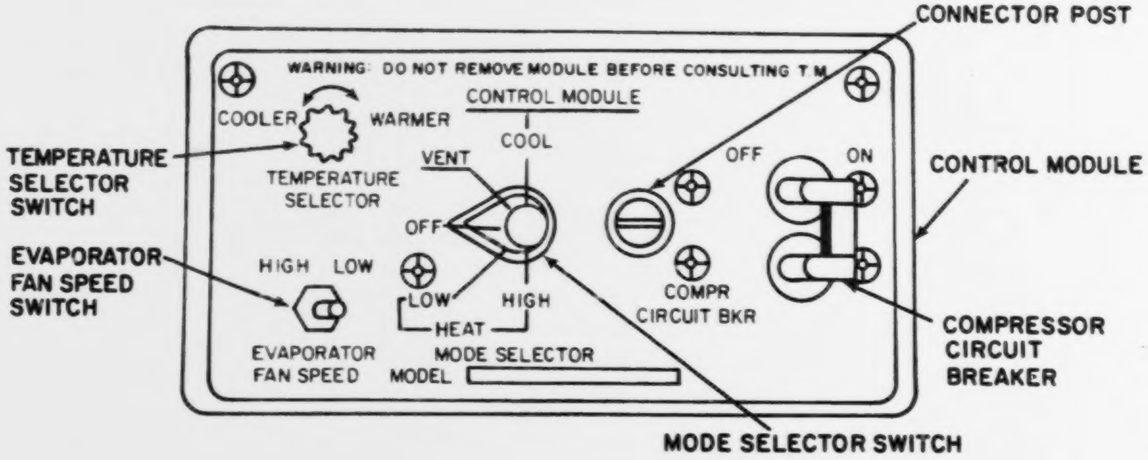
The air conditioner is a self-contained and electric powered unit that provides 10,000 BTU/HR for cooling or 7,000 BTU/HR for heating. Once started, it operates automatically due to the relationship of the components, controls and instruments.

2-2. OPERATOR'S CONTROLS

a. Cooling. With the MODE SELECTOR switch in COOL position, the fan motors and the compressor are energized. The fan motors and compressor run continuously. The flow within the refrigerant circuit determines the cooling mode of unit. With the fan motor and compressor operating, the flow within the refrigerant circuit is controlled by the temperature selector switch. The evaporator fan speed is controlled by A HIGH or LOW speed switch. The compressor is protected from current overload by a circuit breaker in the control module.

b. Heating. With the MODE SELECTOR switch in the HEAT position, air is blown by the evaporator fan as in cooling, but the heating elements are energized instead of the refrigeration system.

c. Ventilation. Placing the MODE SELECTOR switch in the VENT position energizes the evaporator fan motor which forces air out of the evaporator outlet louver into the room. The amount of outdoor air used for ventilation is determined by the position of the ventilation damper actuator.


CONNECTOR POST
WARNING: DO NOT REMOVE MODULE BEFORE CONSULTING T.M.
CONTROL MODULE
COOLER
WARMER
COOL
TEMPERATURE SELECTOR SWITCH
TEMPERATURE SELECTOR
VENT
OFF
ON
CONTROL MODULE
OFF
EVAPORATOR FAN SPEED SWITCH
HIGH
LOW
LOW
HIGH
HEAT
COMPR CIRCUIT BKR
EVAPORATOR FAN SPEED
MODE SELECTOR
MODEL
COMPRESSOR CIRCUIT BREAKER
MODE SELECTOR SWITCH

Section II. PREVENTATIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-3. GENERAL

a. Before You Operate (B). Always keep in mind the CAUTIONS and WARNINGS. Perform (B) PMCS before you operate.

b. While You Operate (D). Always keep in mind the CAUTIONS and WARNINGS. Perform (D) PMCS while you operate.

c. After You Operate (A). Be sure to perform (A) PMCS after operation.

d. If Your Equipment Fails to Operate. Troubleshoot with proper equipment. Report any deficiencies using the proper forms. See DA PAM 738-750.

2-4. OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS)

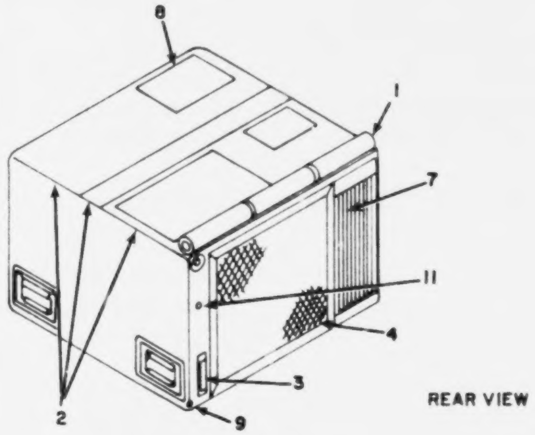
Note: Within designated intervals, these checks are to be performed in the order listed.

B-Before Operation D-During Operation A-After Operation

Item No.	Interval			Item to be Inspected	Procedures:	Equipment is not ready/ available if
	B	D	A			
1	●			Canvas Cover	With cover rolled up for operation, check securing ties for damage. Report damage to organizational maintenance personnel.	Cover can not be secured.
2	●		●	Panels	Inspect for security of attachment and cleanliness. Report damaged condition to organizational maintenance personnel.	Panels missing or severly damaged.
3	●		●	Fresh Air Screen	Inspect for obstructions and insecure mountings. Remove obstructions.	Screen missing loose or damaged.

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS)
Continued

Note: Within designated intervals, these checks are to be performed in the order listed.

<table>
<tr><th colspan="7">B-Before Operation D-During Operation A-After Operation</th></tr>
<tr><th rowspan="2">Item No.</th><th colspan="3">Interval</th><th rowspan="2">Item to be Inspected</th><th rowspan="2">Procedures:</th><th rowspan="2">Equipment is not ready/ available if</th></tr>
<tr><th>B</th><th>D</th><th>A</th></tr>
<tr><td colspan="7">

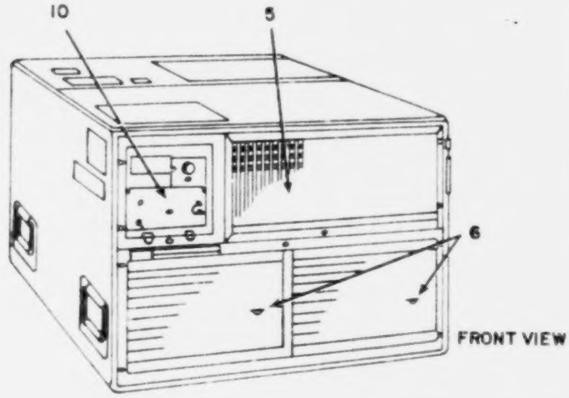

</td></tr>
<tr><td>4</td><td>●</td><td></td><td>●</td><td>Condenser Guard</td><td>Inspect for cleanliness, obstructions, damage, and security of attachment. Report damaged condition to organizational maintenance personnel.</td><td>Guard requires cleaning, is obstructed, damaged, loose or missing.</td></tr>
<tr><td>5</td><td>●</td><td></td><td>●</td><td>Evaporator Outlet Louver</td><td>Inspect for cleanliness, obstructions, damage, and security of attachment. Report damaged condition to organizational maintenance personnel.</td><td>Louver requires cleaning, is obstruced, damaged, loose or missing.</td></tr>
<tr><td>6</td><td>●</td><td></td><td>●</td><td>Evaporator Inlet Louver</td><td>Inspect for cleanliness, obstructions, damage, and security of attachment. Report damaged condition to organizational maintenance personnel.</td><td>Louver requires cleaning, is obstruced, damaged, loose or missing.</td></tr>
</table>

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) Continued

Note: Within designated intervals, these checks are to be performed in the order listed.

B-Before Operation D-During Operation A-After Operation

Item No.	Interval B	Interval D	Interval A	Item to be Inspected	Procedures:	Equipment is not ready/ available if
7	●		●	Condenser Louver	Check for insecure mountings and damaged louver blades. Report damaged condition to organizational maintenance personnel.	Louver requires cleaning, is obstructed, damaged or loose.
8	●		●	Information Plates	Check for security and legibility.	
9	●		●	Condensate Drain Tubes	Inspect drains for obstructions. Remove obstructions as required.	Obstructions cannot be removed.
10	●			Control Module	Insure knobs are in place and check to see that switches function properly. Report damaged condition to organizational maintenance personnel.	Knobs are missing or switches do not function properly.
11		●		Liquid Sight Indicator	After approximately five minutes of operation, check for moisture and low refrigerant charge. Yellow indicates moisture; bubbles or milky appearance indicates low charge. Report abnormal condition to direct support maintenance personnel.	Moisture or low charge is indicated.

Section III. OPERATION UNDER USUAL CONDITIONS

2-5. STARTING AND OPERATING INSTRUCTIONS FOR COOLING

CAUTION

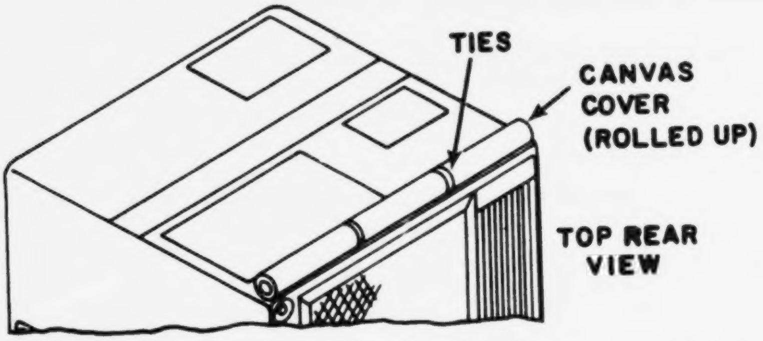
Unit should have power applied for four hours prior to operating in the cooling mode in order to heat compressor oil.

a. Starting

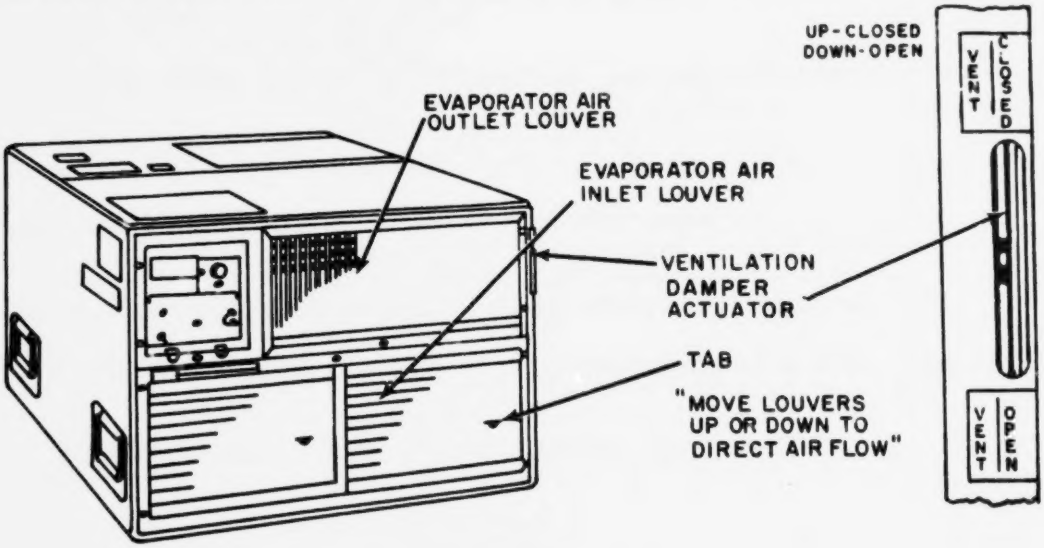
(1) Refer to the preventive maintenance checks and services table before operation.

(2) Check for correct voltage at power source (115 volts, 50/60 hz). Connect the main power to the unit.

(3) Roll up and tie the fabric cover.


TIES
CANVAS COVER (ROLLED UP)
TOP REAR VIEW

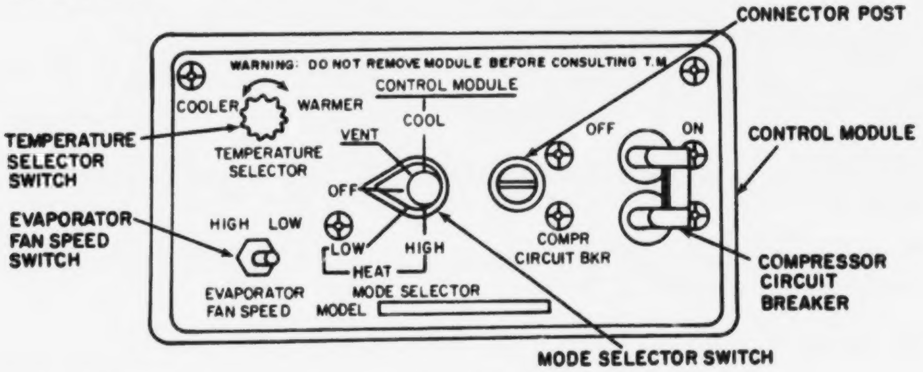
(4) Open the evaporator inlet louvers by moving the tabs up or down as required. Ensure evaporator outlet louvers are open by adjusting each louver individually.


UP-CLOSED
DOWN-OPEN
VENT
CLOSED
VENT
OPEN
EVAPORATOR AIR OUTLET LOUVER
EVAPORATOR AIR INLET LOUVER
VENTILATION DAMPER ACTUATOR
TAB
"MOVE LOUVERS UP OR DOWN TO DIRECT AIR FLOW"

2-5. STARTING AND OPERATING INSTRUCTIONS FOR COOLING - Continued

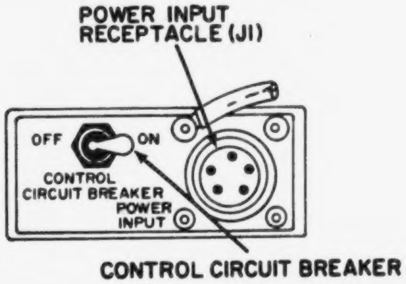
(5) Turn the ventilation damper actuator to close the damper door.

(6) Turn the temperature selector switch to WARMER (lowest cooling position clockwise).


CONNECTOR POST
WARNING: DO NOT REMOVE MODULE BEFORE CONSULTING T.M.
CONTROL MODULE
COOLER
WARMER
COOL
VENT
OFF
ON
TEMPERATURE SELECTOR SWITCH
TEMPERATURE SELECTOR
CONTROL MODULE
OFF
EVAPORATOR FAN SPEED SWITCH
HIGH LOW
LOW
HIGH
HEAT
COMPR CIRCUIT BKR
COMPRESSOR CIRCUIT BREAKER
EVAPORATOR FAN SPEED
MODE SELECTOR
MODEL
MODE SELECTOR SWITCH

(7) Position compressor circuit breaker to "ON".

(8) Position the control circuit breaker to "ON".


POWER INPUT RECEPTACLE (JI)
OFF
ON
CONTROL CIRCUIT BREAKER
POWER INPUT
CONTROL CIRCUIT BREAKER

(9) Position the mode selector switch to VENT, then position the mode selector switch to COOL. (allow 30 to 45 sec delay for compressor to begin operating)

b. Cooling Operation. After starting the air conditioner for cooling operation, adjust for amount of air and degree of cooling.

(1) Leave the mode selector switch on COOL.

(2) Adjust the temperature selector switch from WARMER to the degree of cooling desired. See Table 2-2 for operator control setting.

(3) Set the evaporator fan speed switch to the desired position.

(4) Adjust the evaporator outlet louvers individually to direct the airflow as desired.

2-5. STARTING AND OPERATING INSTRUCTIONS FOR COOLING - Continued

NOTE

Cool air is denser than warm air so it has a tendency to flow downward. To offset this tendency, it is often advisable to adjust the evaporator outlet louvers to direct the cool air slightly upward.

c. Cooling With Fresh Air.

(1) When the vent damper door is open to admit fresh air, partially close the evaporator inlet louver to balance the incoming air.

(2) Keep the vent damper door closed during heavy rain.

2-6. STOPPING THE AIR CONDITIONER

a. Position the mode selector switch to OFF.
b. Close the evaporator inlet louver blades by pushing tabs down.
c. Close the ventilation damper by turning the ventilation damper actuator.
d. If a shutdown is to be for an extended period, cover condenser side of unit with fabric cover and disconnect the power cable.

2-7. STARTING AND OPERATING INSTRUCTIONS FOR HEATING

a. Starting

(1) Perform the preventive maintenance checks and services (Table 2-1).

(2) Check for the correct voltage (115 volts, 50/60 Hz)

(3) Roll up and tie fabric cover.

(4) Open the evaporator inlet louver by moving the tabs up or down as required.

(5) Open the evaporator outlet louvers.

(6) Turn the ventilation damper actuator to close the damper door.

(7) Turn the temperature selector switch to COOLER (lowest heating position - counter clockwise).

(8) Position the control circuit breaker to ON.

(9) Position the mode selector switch to LOW HEAT. Position it to HIGH HEAT if more heat is wanted. (Wait 3 to 5 minutes for heat).

b. Heating Operation. After starting the air conditioner in the heating mode, adjust it as follows:

(1) Position the mode selector switch to HIGH HEAT or LOW HEAT as desired.

2-7. STARTING AND OPERATING INSTRUCTIONS FOR HEATING - Continued

(2) Adjust the temperature selector switch from COOLER to the desired temperature. See Table 2-2 for operator control settings.

(3) Adjust the evaporator outlet louver blades to direct the airflow as desired.

NOTE

Warm air is less dense than cool air, so it has a tendency to rise. To obtain comfortable temperatures near the floor and lower parts of the room, it is often advisable to adjust the evaporator louver blades to direct the air slightly downward.

c. Heating Operation with Fresh Air.

(1) Open the damper door by turning the ventilation damper actuator if fresh air is desired.

(2) Partially close the evaporator inlet louver blades.

2-8. STOPPING THE AIR CONDITIONER

a. Position the mode selector switch to OFF.
b. Close the evaporator inlet louver blades by pushing tabs down.
c. Close the ventilation damper by turning the ventilation damper actuator.
d. If a shutdown is to be for an extended period, cover condenser side of unit with fabric cover and disconnect the power cable.

2-9. VENTILATING OPERATION To operate the air conditioner as a ventilating blower, without affecting temperature, proceed as follows:

a. Perform the preventive maintenance checks and services (Table 2-1).
b. Check for the correct voltage (115 volts, 50/60 Hz).
c. Roll up and tie the fabric cover.
d. Turn the ventilation damper actuator to open the damper door.
e. Partially close the evaporator inlet louver blades.
f. Position the mode selector switch to VENT.
g. Open evaporator outlet louvers.

2-10. STOPPING THE AIR CONDITIONER

a. Position the mode selector switch to OFF.
b. Close the evaporator inlet louver blades by pushing tabs down.
c. Close the ventilation damper by turning the ventilation damper actuator.
d. If a shutdown is to be for an extended period, cover condenser side of unit with fabric cover and disconnect the power cable.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

NOTE

The air conditioner can be equipped for operation in chemical biological radiological (CBR) environment by connecting filtering equipment to the rectangular covered opening at the lower left side of the rear surface of the unit.

2-11. OPERATION IN EXTREME COLD

a. General. The air conditioner is designed to operate on the heating cycle in ambient temperatures as low as -50°F (-45°C) and on cooling cycle with 0°F (-18°C) air entering the condenser and 70°F (21°C) air entering the evaporator.

CAUTION

To start unit in cool mode at 0°F (-18°C) ambient, have organizational maintenance personnel jumper Low Pressure Cut-Out (LPCO) switch (S-5).

b. Before Operation. Before starting on cooling cycle be sure fabric cover is rolled up and secured. Clear all ice and snow from openings. Be sure all dampers are in operating condition.

c. After Operation. Roll down and snap on fabric cover over condenser intake and outlet.

CAUTION

Do not disturb wiring during cold weather unless absolutely necessary. Cold temperatures make wiring and insulation brittle and easily broken.

2-12. OPERATION IN EXTREME HEAT

a. General. The air conditioner is designed to operate satisfactorily at temperatures up to 125°F (52°C). If unit is operated at condenser inlet temperatures higher than 125°F (52°C), the cooling capacity will be lowered and long periods of operation at extended temperatures may cause compressor or condenser fan motor to overheat and trip their internal overload switches or the high pressure cutout switch to shut the unit off.

b. Filters. To maintain the highest capacity of the unit, the evaporator inlet filter and fresh air screen should be cleaned weekly or more often if necessary. Dirty filters reduce the flow of air across the evaporator coil, thereby reducing the capacity of the air conditioner.

c. Guards and Louvers. Keep all guards and louvers clean and free of any obstructions to maintain full air flow through the air conditioner.

d. Coils. Clean evaporator and condenser coils as frequently as necessary to prevent dirt or other matter from obstructing the air flow.

2-13. OPERATION IN DUSTY OR SANDY AREAS

a. Protection. Shield the air conditioner from dust as much as possible. Take advantage of any natural barriers which offer protection.

b. Cleaning. Keep the air conditioner as clean as possible. Pay particular attention to the louvers. Use compressed air, if available, to aid in cleaning.

NOTE

Never operate the unit without having the air filters in place.

2-14. OPERATION UNDER RAINY OR HUMID CONDITIONS

Take special precautions to keep equipment dry. If installed outdoors, cover the equipment with a waterproof cover when it is not in use. Remove cover during dry periods. Take all necessary precautions to keep the electrical components free from moisture. Keep vent damper actuator closed during heavy rain.

WARNING

Make sure power is disconnected from air conditioner before touching any wiring or other electrical parts.

2-15. OPERATION IS SALT WATER AREAS

WARNING

Disconnect power source prior to washing the air conditioner.

a. General. Wash the exterior and condenser section of the unit, particularly the condenser outlet louver control cable, with clean fresh water at frequent intervals. Be careful not to damage electrical system with water. Special attention must be given to prevent rust and corrosion.

b. Painting. Paint all exposed areas where paint has cracked, peeled, or blistered, or report condition to organizational maintenance. Coat all exposed areas of polished metal with a light coat of grease.

Table 2-2. OPERATOR CONTROL SETTINGS

Mode	Mode Selector Switch	Temperature Control Thermostat	Fresh Air Damper	Evaporator Inlet Louver	Evaporator Outlet Louver	Fabric Cover
Ventilate with 100% recirculated air	VENT	Does not operate	Closed	Open	Adjust to suit	Rolled up or snapped closed
Ventilate with make-up (Fresh air)	VENT	Does not operate	Open	Partially closed	Adjust to suit	Rolled up or secured
Ventilate with 100% fresh air	VENT	Does not operate	Open	Closed	Adjust to suit	Rolled up and secured
Heating with 100% recirculated air	LO HEAT or HI HEAT	Desired temperature	Closed	Open	Slightly down for best results	Rolled up or snapped closed
Heating with make-up (fresh air)	LO HEAT or HI HEAT	Desired temperature	Open	Partially closed	Slightly down for best results	Rolled up and secured
Cooling with 100% recirculated air	COOL	Desired temperature	Closed	Open	Slightly up for best results	Rolled up and secured
Cooling with make-up (fresh air)	COOL	Desired temperature	Open	Partially closed	Slightly up for best results	Rolled up and secured
Any mode with make-up air thru CBR filter	Desired mode	Desired temperature	Closed and sealed	Partially closed	Adjust to suit	Rolled up and secured

CHAPTER 3

OPERATOR'S MAINTENANCE INSTRUCTIONS

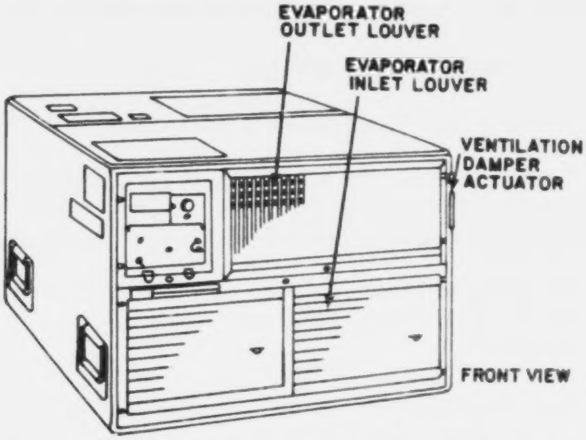
Section I. LUBRICATION INSTRUCTIONS

3-1. FAN AND COMPRESSOR MOTOR LUBRICATION

Motors driving the evaporator fan, condenser fan and compressor are permanently lubricated. The compressor is a sealed unit complete with lubricant. The rotating parts do not need any lubrication.

3-2. AIR LOUVERS

The evaporator louvers should operate freely. If they bind, lubricate with a small amount of lightweight general purpose machine oil.



Section II. OPERATOR TROUBLESHOOTING

3-3. GENERAL

a. This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the air conditioner. Each malfunction is followed by a list of probable causes and actions to take to remedy the malfunction. You should perform the tests/inspections and corrective action in the order listed.

b. This manual cannot list all malfunctions that may occur; nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

3-4. TROUBLESHOOTING TABLES

Table 3-1. Operator Troubleshooting

MALFUNCTION
    TEST OR INSPECTION
        CORRECTIVE ACTION

---

1. AIR CONDITIONER FAILS TO OPERATE

Step 1. Verify that power cable is connected to proper voltage.

Connect power cable to receptacle.

Step 2. Check to be sure that control or compressor circuit breaker is ON.

Reset circuit breaker.

Step 3. Make sure that mode selector switch is not in OFF position.

Turn selector knob to desired operation.

Step 4. Check that high and low pressure switches have been reset.

Reset pressure switches and wait for compressor to start.

2. INSUFFICIENT COOLING

Step 1. Check to be sure that mode selector switch is properly positioned.

Set switch to COOL.

Step 2. Make sure that temperature switch is set correctly.

Adjust setting to COOLER.

Step 3. Determine that sufficient air is passing across evaporator coil by placing a piece of paper in front of the evaporator inlet louver. The paper should be held against the louver blades by the air.

Open evaporator inlet louver blades. Remove any obstructions from evaporator inlet and outlet louvers.

Step 4. Make sure that there is not too much outside air entering unit.

Close or adjust damper door.

3-4. TROUBLESHOOTING TABLES - Continued

Table 3-1. Operator Troubleshooting - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

---

2. INSUFFICIENT COOLING (Continued)

Step 5. Check liquid sight indicator to see whether there is sufficient refrigerant in the system.

If sight glass is not full and clean report to Direct Support Maintenance Personnel.

Step 6. Check to see whether evaporator fan switch is set at low speed.

Reset switch to high speed.

Step 7. Check to see that sufficient air is passing through condenser coil by placing a piece of paper on the condenser guard. The paper should be held against the guard by the air.

Remove any obstructions from condenser inlet and outlet. Make sure that condenser louver outlet is open.

3. NO HEAT OR LOW HEAT

Step 1. See that mode selector switch is properly set.

Set switch on LOW HEAT or HIGH HEAT.

Step 2. Make sure that temperature selector switch is set correctly.

Reset switch.

Step 3. Check for sufficient air movement over heaters by placing a piece of paper in front of the evaporator inlet louver. The paper should be held against the louver by the air.

Remove any obstructions from evaporator inlet and discharge louvers. Make sure that evaporator inlet louver blades are open.

Section III. OPERATOR MAINTENANCE INSTRUCTIONS

3-5. GENERAL. Operator maintenance consists primarily of the following procedures:

a. Servicing screens and guards.

b. Adjusting louvers, dampers and actuators, and control module.

3-6. SCREENS AND GUARDS - SERVICE

This task covers: Cleaning

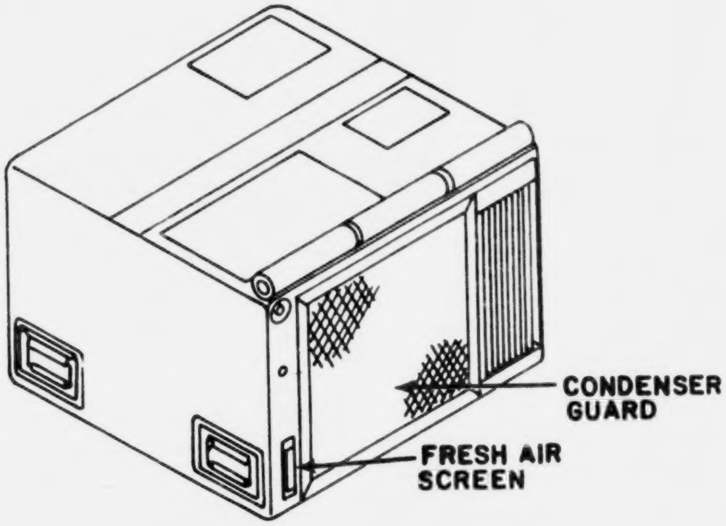
INITIAL SETUP

Materials/Parts

Dry Cleaning Solvent
(Item 16, App. E)
Brush
Cleaning Cloth

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect the power source before performing any maintenance function. **WARNING** Do not use compressed air for cleaning purposes except where reduced to less than 30 psi (2.1 kg/cm^2) and then only with effective chip guarding and Personnel protective equipment. **WARNING** Dry cleaning solvent (Item 16 App. E) used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F (38°C).	

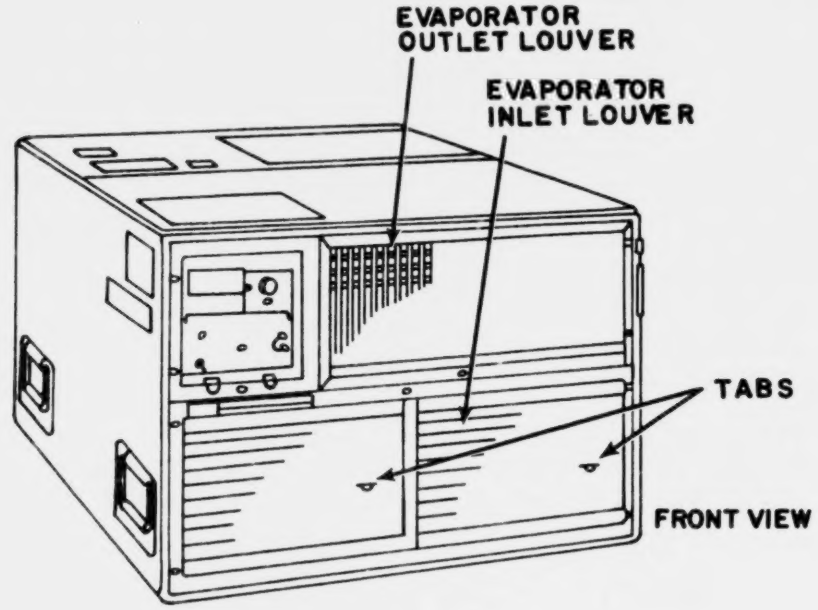
LOCATION/ITEM	ACTION	REMARKS
SERVICE Rear of Housing CLEAN	a. Brush off any loose dirt of foreign matter, and remove obstructions from the condenser guard & fresh air screen. b. Wipe off with a cloth moistened with dry cleaning solvent (Item 16, App. E). c. Inspect for security of attachment and damage. d. Report damaged condition to organizational maintenance personnel.	



3-7. LOUVERS - ADJUST

This task covers: Adjust

LOCATION/ITEM	ACTION	REMARKS
ADJUST		


EVAPORATOR OUTLET LOUVER
EVAPORATOR INLET LOUVER
TABS
FRONT VIEW

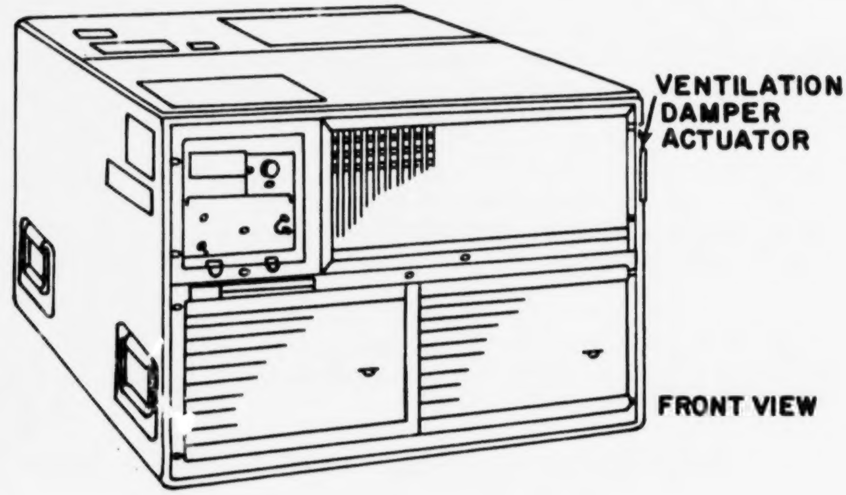
a. Using the tabs provided, Position the evaporator inlet louver so that the louvers are fully open when the ventilation damper actuator is in the closed position. Partially close the evaporator inlet louver when the ventilation damper actuator is in the open position.

b. It is recommended that the evaporator outlet louver be adjusted to direct the airflow slightly upward when the air conditioner is operated in the cool mode, and slightly downward when the air conditioner is operated in the heat mode.

3-8. FRESH AIR DAMPER AND ACTUATOR - ADJUST

This task covers: Adjust

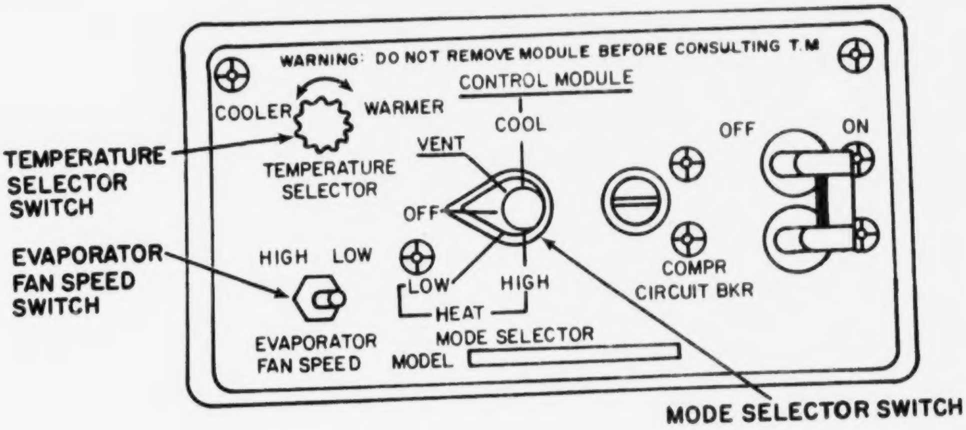
LOCATION/ITEM	ACTION	REMARKS
ADJUST		
Ventilation damper	a. Check for bindings; remove obstructions. b. Brush off any loose dirt or foreign matter. c. Inspect for security of attachment and damage. d. Report damaged condition to organizational maintenance personnel. e. Adjust ventilation damper actuator to desired degree of fresh air.	



3-9. CONTROL MODULE - ADJUST

This task covers: Adjust

LOCATION/ITEM	ACTION	REMARKS
ADJUST		


WARNING: DO NOT REMOVE MODULE BEFORE CONSULTING T.M
CONTROL MODULE
COOLER
WARMER
TEMPERATURE SELECTOR
TEMPERATURE SELECTOR SWITCH
COOL
VENT
OFF
OFF
ON
HIGH
LOW
EVAPORATOR FAN SPEED SWITCH
LOW
HIGH
HEAT
COMPR CIRCUIT BKR
EVAPORATOR FAN SPEED
MODE SELECTOR
MODEL
MODE SELECTOR SWITCH

a. Rotate the temperature selector switch to cooler (counter-clockwise) or warmer (clockwise) while the air conditioner is being operated in either the cool or heat mode in order to acheive the desired temperature in the conditioned area.

b. Position the evaporator fan speed switch to high or low depending on the amount of airflow desired.

c. Rotate the mode selector switch to the vent or cool position (clockwise), or to the low heat or high heat position (counter- clockwise).

CHAPTER 4

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

4-1. MAINTENANCE REPAIR PARTS

Repair parts for the air conditioner are listed and illustrated in TM 5-4120-378-24P.

4-2. COMMON TOOLS AND EQUIPMENT

For common tools and equipment, refer to the Table of Organization and Equipment (TOE).

4-3. SPECIAL TOOLS AND TEST EQUIPMENT

No special tools or test equipment are required.

4-4. CONSUMABLE MATERIALS

Refer to Appendix E, Section II for a list of expendable supplies and materials.

Section II. SERVICE UPON RECEIPT

4-5. SERVICE UPON RECEIPT

a. Unloading. The air conditioner is shipped in a crate which has a skid pallet base. It should be handled with fork lift equipment with at least 300 pound (136.2 kg) capacity. Reasonable precaution should be taken to prevent damage by dropping or bumping. Keep the unit upright during unloading.

b. Unpacking. Move the equipment as close to the site of installation as possible before unpacking. Remove crating hardware and metal straps being careful not to damage the unit with the tools used in uncrating.

c. Checking Unpacked Equipment.

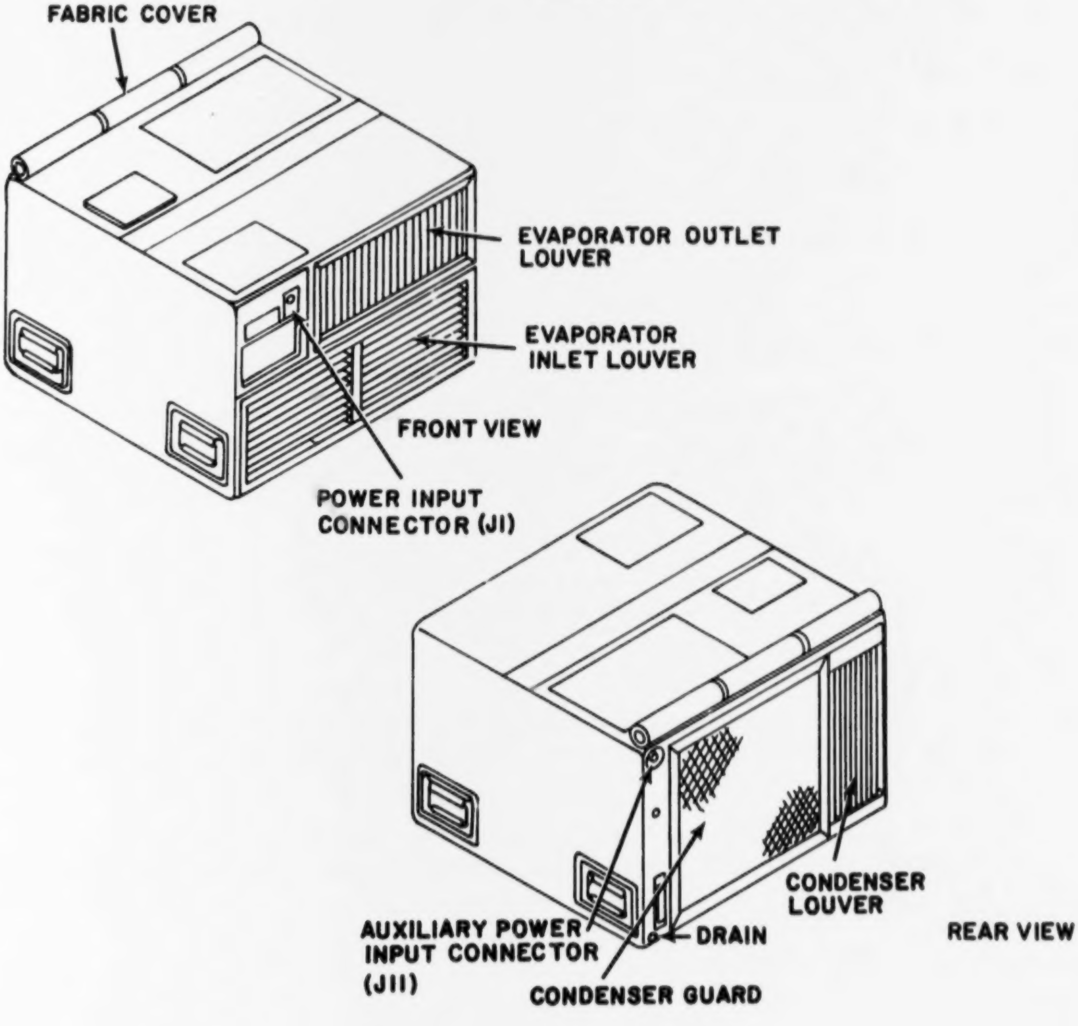
(1) Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DA Form 368 Quality Deficiency Report (QDR).

(2) Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA PAM 738-750.

(3) Check to see whether the equipment has been modified.

4-6. SERVICE UPON RECEIPT CHECKLIST

LOCATION	ITEM	ACTION	REFERENCE
1. Exterior	Louvers, Covers, Drains Guards, Controls, Switches	Perform operator PMCS before you operate.	Table 2-1
2. Front	Main Power Connectors	a. Inspect connector for damage. b. Replace damaged connector.	Table 2-1 Para 4-39


FABRIC COVER
EVAPORATOR OUTLET LOUVER
EVAPORATOR INLET LOUVER
FRONT VIEW
POWER INPUT CONNECTOR (JI)
CONDENSER LOUVER
REAR VIEW
DRAIN
AUXILIARY POWER INPUT CONNECTOR (JII)
CONDENSER GUARD

4-7. INSTALLATION

a. General.

(1) Air conditioner is assembled, ready for operation.

(2) It contains full charge of refrigerant and compressor oil.

b. Mounting.

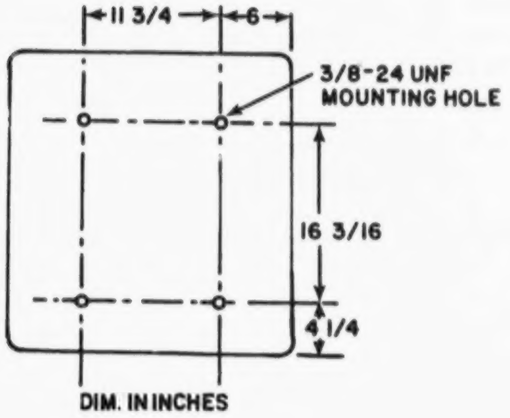
(1) Place the unit on a firm, level surface to permit proper drainage of water that condenses out of the air.

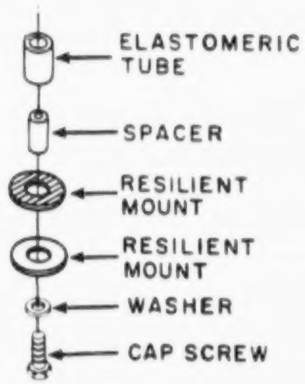
(2) Position the unit so that the control panel and the condenser and evaporator louvers are accessible to the operator and to maintenance personnel.

(3) Check that there are no obstructions in front of any air inlet or outlet louvers or other openings.

(4) The dimensions for base-mounting holes are shown below. The resilient mounting parts shown in the lower parts of the figure are shipped with the air conditioner.

(5) Connect a drain line if necessary.


11 3/4
6
3/8-24 UNF
MOUNTING HOLE
16 3/16
4 1/4
DIM. IN INCHES


ELASTOMERIC
TUBE
SPACER
RESILIENT
MOUNT
RESILIENT
MOUNT
WASHER
CAP SCREW

4-7. INSTALLATION – Continued

c. Grounding.

(1) Clean front of ground connection to obtain a bright metal surface.

(2) Remove insulation from ends of grounding wire (10 AWG) or use bare ends. Make loop at wire ends.

(3) Using 1/4-20 screw and washer, attach one end of wire to air conditioner front panel ground connection.

(4) Wrap a suitable length of perforated strap around clean surface on water pipe or grounding rod.

(5) Using a 1/4-20 screw, two washers and nut, attach other end of grounding wire to strap in a manner such as to securely tighten strap to pipe or grounding rod, (10 AWG) and wire to strap. If vehicle chassis is used, secure other end of grounding wire to vehicle chassis using screw, nut, and lockwasher. The screw shall fit in a tapped hole in the chassis or frame or it shall be held in hole by nut.

4-8. CONNECT THE POWER SOURCE

CAUTION

Make sure the mode selector switch is in the OFF position.

CAUTION

For safe operation, connect a ground wire (at least No. 10 AWG) to the ground connection.

a. Connect the air conditioner power cable to a 115-volt, 50/60 Hz, single phase power source.

b. If auxiliary power input connector (J11) is used, refer to Appendix F, Wiring Diagram for connections.

4-9. OPERATION CHECK AND ADJUSTMENTS

a. Check operation of unit.

b. Check for proper fan rotation. With the fan rotating, check to see that air is sucked through evaporator inlet louver and blown out through evaporator outlet louver.

Section III. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

4-10. GENERAL

To insure that the air conditioner is ready for operation at all times it must be inspected systematically so that the defects may be discovered and corrected before the result is serious damage or failure. Defects discovered during operation of the unit shall be noted for future corrections to be made as an operation has ceased. Stop operation which would damage the equipment if operation were to continue. All deficiencies and shortcomings shall be recorded together with the corrective action taken on DA Form 2404 Equipment Inspection and Maintenance Inspection Worksheet, at the earliest opportunity. If your equipment fails to operate, troubleshoot with proper equipment. Report any deficiencies using proper forms. See DA PAM 738-750.

4-11. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLE

WARNING

Dry cleaning solvent (Item 16, App. E) used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F (38°C).

Do not use compressed air for cleaning purposes except where reduced to less than 30 psi (2.1 kg/cm^2) and then only with effective chip guarding and personal protective equipment.

Interval Columns. The columns headed "W" and "Q" contain a dot (●) opposite the appropriate check. If a given check is performed weekly, a dot is shown opposite the check in the "W" column; if the check is accomplished quarterly, the dot is shown in the column headed "Q".

Table 4-1. Organizational Preventive Maintenance Checks and Services (PMCS) – Continued

W-Weekly Q-Quarterly

Item No.	Interval		Item to be Inspected	Procedures:	Equipment is not ready/ available if
	W	Q			
1	●		Evaporator Inlet Filter and Evaporator Inlet Louver	a. Slide air filter (1) out of the retaining clips (2).	Items are damaged, missing or clogged.
				WARNING Dry cleaning solvent (Item 16, App. E) used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near flame or excessive heat. Flash point of solvent is 100°F (38°C).	
				b. Inspect air filter (1) for damage. Replace if damaged. c. Clean air filter (1) d. Inspect louver (3) for bent blades. Straighten or replace. e. Lubricate air filter (1) with filter-kote (Item 17, App. E). Drain off excessive oil. f. Slide air filter (1) into evaporator inlet louver. (3) g. Install evaporator inlet louver. (3)	

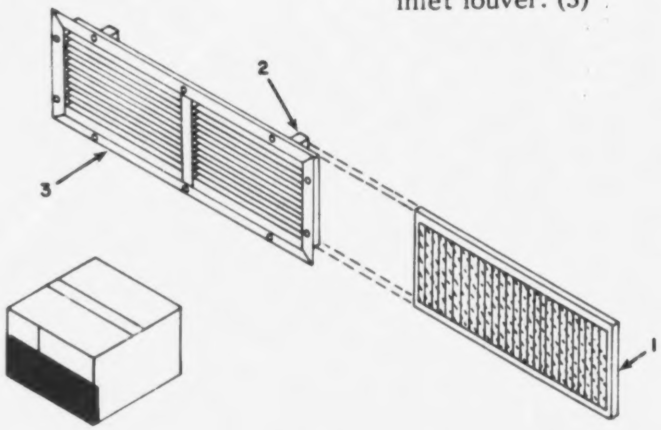


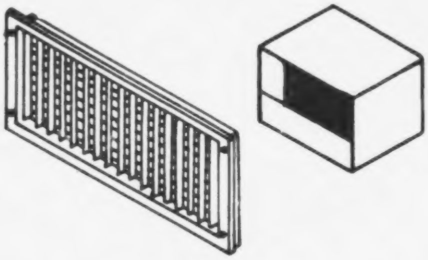
Table 4-1. Organizational Preventive Maintenance Checks and Services (PMCS) – Continued

W–Weekly Q–Quarterly

Item No.	Interval W	Interval Q	Item to be Inspected	Procedures:	Equipment is not ready/ available if
2	●		Evaporator Outlet Louver	a. Check louver for dirt or damage. b. Clean or replace damaged parts. c. Inspect louver for bent blades. Straighten or replace.	Louver missing or needs to be replaced.

WARNING

Dry cleaning solvent (Item 16, App. E) used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F (38°C).



Item No.	Interval W	Interval Q	Item to be Inspected	Procedures:	Equipment is not ready/ available if
3	●		Mist Eliminator	a. Remove top cover (1). b. Slide mist eliminator (2) out of the mist eliminator holder(3).	Items are damaged, missing or clogged.

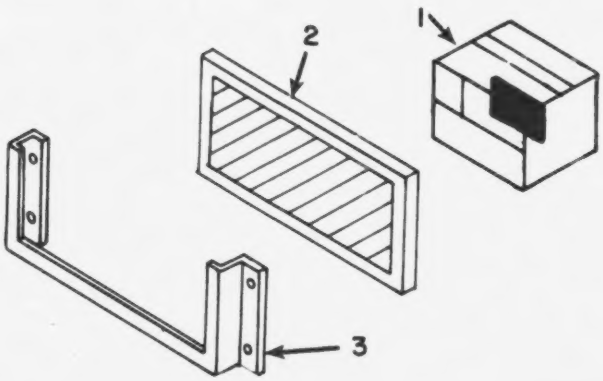
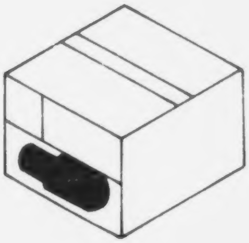


Table 4-1. Organizational Preventive Maintenance Checks and Services (PMCS) - Continued

W-Weekly Q-Quarterly

Item No.	Interval W	Interval Q	Item to be Inspected	Procedures:	Equipment is not ready/ available if
				c. Inspect mist eliminator (2) for damage. Replace if damaged. d. Clean mist eliminator (2). e. Lubricate mist eliminator (2) with filter-kote (Item 17, App. E). Drain off excessive oil. f. Install mist eliminator (2) in holder (3).	
4	●		Evaporator Impeller and Motor and Housing	a. Inspect evaporator motor (1) and impeller (2) and housing (3) for security of attachment. b. Check wiring (4) for damage. c. Replace damaged fan (2) or motor (1). (para. 4-32 and 4-33).	Items loose or damaged.



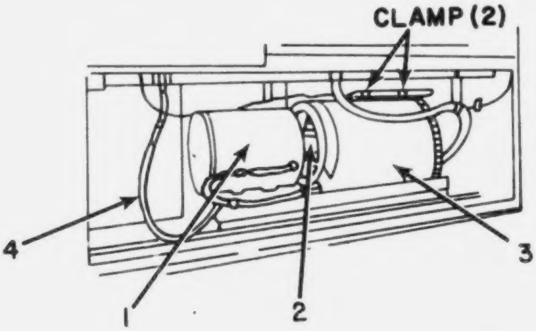


Table 4-1. Organizational Preventive Maintenance Checks and Services (PMCS) – Continued

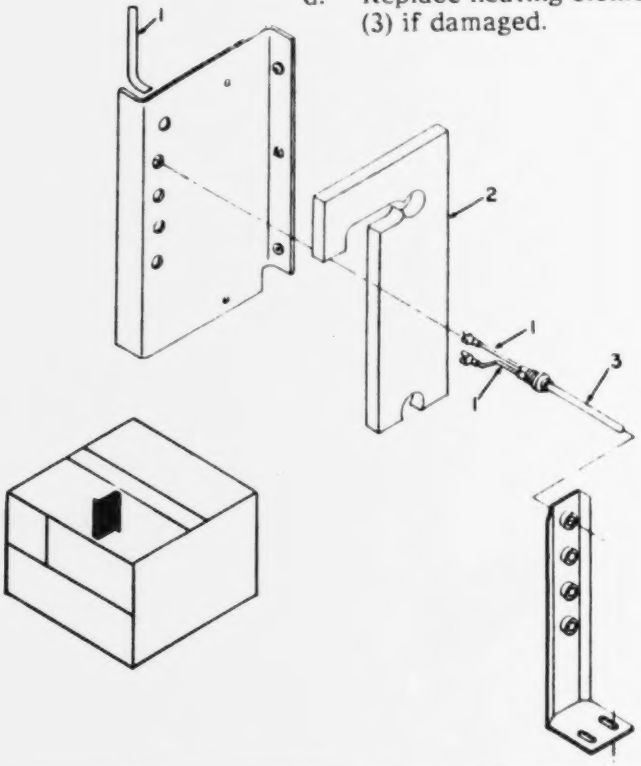
	W–Weekly			Q–Quarterly	
Item No.	Interval W	Q	Item to be Inspected	Procedures:	Equipment is not ready/ available if
5	●		Heaters	**WARNING** Disconnect air conditioner power supply before doing maintenance work on the electrical system. a. Check for breaks in wiring (1) and insulation (2). Tighten loose connections. b. Check heating elements (3) for damage. c. Clean heating elements (3). d. Replace heating elements (3) if damaged. 	Items loose, or wires or elements are damaged.

Table 4-1. Organizational Preventive Maintenance Checks and Services (PMCS) – Continued

W–Weekly Q–Quarterly

Item No.	Interval W	Interval Q	Item to be Inspected	Procedures:	Equipment is not ready/ available if
6	●		Evaporator Coil	a. Inspect evaporator coil for dirt or damage. Clean or report damage to direct support maintenance personnel. b. Inspect evaporator coil for leaks. Report damage to direct support maintenance personnel.	Item dirty, damaged or leaking refrigerant.

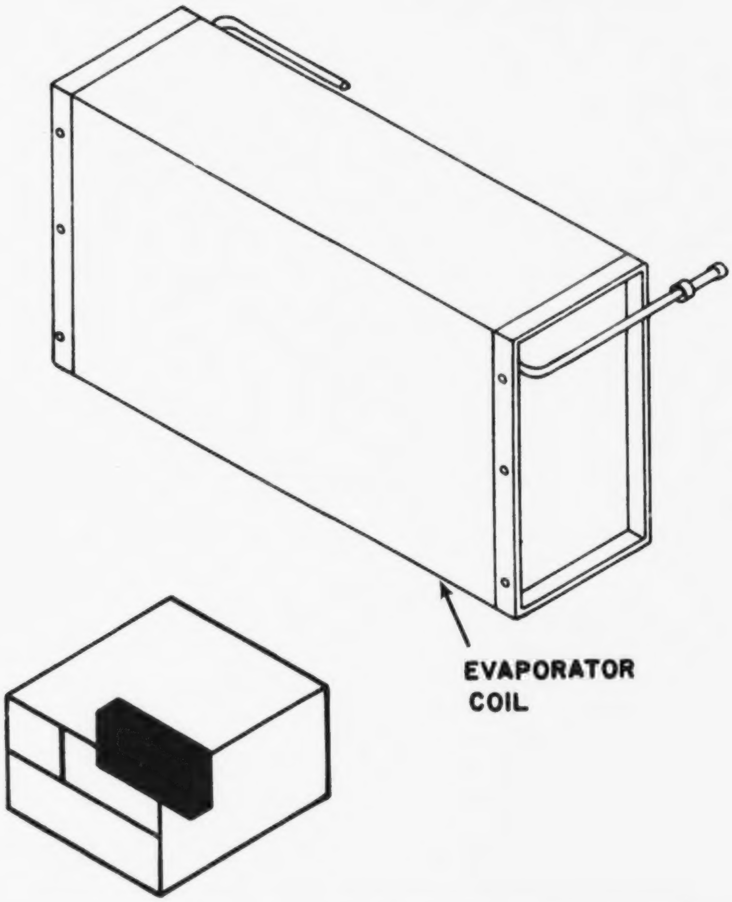
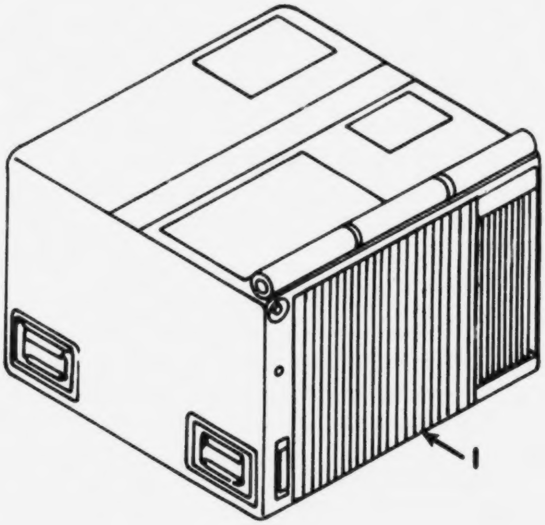


Table 4-1. Organizational Preventive Maintenance Checks and Services (PMCS) - Continued

W-Weekly Q-Quarterly

Item No.	Interval W	Interval Q	Item to be Inspected	Procedures:	Equipment is not ready/available if
7	●		Condenser Coil	a. Inspect condenser coil (1) for dirt or damage. Clean or report damage to direct support maintenance personnel. b. Inspect condenser coil (1) for leaks. Report damage to direct support maintenance personnel.	Item excessively dirty, damaged or leaking refrigerant



Section IV. ORGANIZATIONAL TROUBLESHOOTING

4-12. GENERAL

a. This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the air conditioner. Each malfunction is followed by a list of probable causes and actions to take to remedy the malfunction. You should perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur; nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

c. Control Circuit. The cause of a system's failure to operate can be greatly narrowed if control that caused the failure can be isolated. It is the function of safety devices to open the circuit under certain conditions; therefore, additional checking may be required to determine whether the safety device is open because it is bad or because it is doing what it is suppose to do. The following steps contain instructions for checking the control circuit.

(1) Disconnect power from the air conditioner.

(2) Test continuity across each control in the affected circuit, using an ohmmeter. Refer to the appropriate schematic diagram and wiring diagram (Appendix F) as a guide to the connections in the circuit.

(3) Replace defective parts.

d. Safety Devices. When testing the control circuit and other equipment, you must take into consideration the fact that open safety devices may not be bad. It may be normal for the device to be open under the existing conditions, or it may indicate trouble elsewhere in the air conditioner.

WARNING

Refrigerant under pressure is used in the operation of this equipment.

WARNING

HIGH VOLTAGE is used in the operation of this equipment. DEATH ON CONTACT may result if personnel fail to observe safety precautions. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid. When the technician is aided by operators, he must warn them about dangerous areas.

WARNING

Whenever possible, the input power supply to the equipment must be shut off before beginning work in the equipment.

WARNING

Take particular care to ground every capacitor likely to hold a dangerous potential. When working inside the equipment, after the power has been turned off, always ground every part before touching it.

WARNING

Be careful not to contact high voltage connections of 115 volts ac input when installing or operating this equipment. Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of correct flowing through vital organs of the body.

WARNING

Do not operate the equipment without all guards, louvers, and covers in place and tightly secured

WARNING

Do not be misled by the term "low voltage". Potentials as low a 50 volts may cause death under adverse conditions.

4-13. ORGANIZATIONAL TROUBLESHOOTING TABLES

Table 4-2. Organizational Troubleshooting

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

NOTE: Before using this table, be sure you have performed all applicable operating checks.

AIR CONDITIONER

1. AIR CONDITIONER FAILS TO OPERATE

Step 1. Check to see that main power cable is connected.

Connect cable.

Step 2. Make sure that you are using the correct voltage.

Check line voltage with voltmeter for 115 VAC, single phase, 50/60 Hz power.

Step 3. Inspect main power receptacle connections for breaks.

Replace connector. (Refer to paragraph 4-28).

Table 4-2. Organizational Troubleshooting - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

---

1. AIR CONDITIONER FAILS TO OPERATE - Continued

Step 4. Check for loose electrical connections.

Tighten connections.

Step 5. Inspect rotary selector switch for incorrect setting. (See Table 2-2, Operator Control Setting)

Turn selector switch to COOL or VENTILATE.

Step 6. Check to see whether control or compressor circuit breaker is in OFF position or is defective.

Make continuity check with ohmmeter. Reset circuit breaker.

Step 7. Disconnect control circuit transformer and make continuity check of primary and secondary windings, and from windings to case, using ohmmeter. Reset circuit breaker.

If windings do not show continuity, or if windings-to-case continuity exists, replace transformer. (Refer to paragraph 4-31)

Step 8. Apply 30-volt AC to input side terminals of control circuit rectifier, and check to see that 24-28 volts DC exists at end terminals.

Replace bad rectifier. (Refer to paragraph 4-30)

2. INSUFFICIENT COOLING

Step 1. Check to see that mode selector switch is properly positioned.

Step 2. Check liquid sight indicator level to see that refrigerant is colorless and clear. Yellow indicates moisture in system. Milky or bubbly refrigerant indicates low level refrigerant charge.

Report condition to direct support maintenance personnel.

Step 3. Inspect condenser coil for dirt.

Clean coil with 25-30 psi (1.76 -2.11 kg/cm^2) compressed air.

Table 4-2. Organizational Troubleshooting - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

---

2. INSUFFICIENT COOLING - Continued

Step 4. Inspect evaporator inlet air filter for dirt.

Step 5. See whether temperature selector switch is set incorrectly or is defective.

Adjust setting or replace switch, or other corrective action. (Refer to paragraph 4-24)

Step 6. Check evaporator outlet louver to see whether it is bent, or stuck in the closed position.

Repair or replace louver. (Refer to paragraph 4-11)

Step 7. Observe evaporator fan motor to see whether it is worn or defective.

Report fault to direct support maintenance personnel, or replace motor. (Refer to paragraph 4-33)

Step 8. Check to see whether evaporator impeller fan is loose or defective. Tighten setscrew or replace impeller fan. (Refer to paragraph 4-32)

3. EVAPORATOR OR CONDENSER FAN MOTOR FAILS TO OPERATE

Step 1. Make sure that power cable is properly connected.

Connect cable.

Step 2. Check for bad fan motor. (Refer to paragraph 4-33 and 4-36) Check for bad start capacitor by using an ohmmeter. (Refer to paragraph 4-29)

Replace motor. (Refer to paragraph 4-33 and 4-36)

Step 3. Check evaporator or condenser fan motor for binding.

Relieve binding or replace fan motor. (Refer to paragraph 4-33 and 4-36)

Step 4. Check continuity of receptacle or plus terminals. (Refer to paragraph 4-33 and 4-36)

Replace terminals or receptacles. (Refer to paragraph 4-36)

Table 4-2. Organizational Troubleshooting - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

---

3. EVAPORATOR OR CONDENSER FAN MOTOR FAILS TO OPERATE - Continued

Step 5. Disconnect condenser fan motor relay. Actuate primary contacts with 24 volt DC source, then check continuity of contacts that should be closed. (Refer to paragraph 4-25)

Replace bad relay. (Refer to paragraph 4-25)

Step 6. Inspect for bad evaporator fan speed control switch by checking continuity with ohmmeter. (Refer to paragraph 4-24)

Replace bad switch. (Refer to paragraph 4-24)

Step 7. Inspect mode selector Rotary switch for improper adjustment or damage (Refer to paragraph 4-24).

Replace bad switch. (Refer to paragraph 4-24)

WARNING

Disconnect the power source before performing any troubleshooting function.

4. COMPRESSOR WILL NOT START

Step 1. Make sure that compressor or control circuit breakers or selector switch is properly set.

Reset controls properly.

Step 2. Check for open contacts of high-or-low-pressure cut-out switches. (Refer to paragraph 5-22)

Reset pressure switches. Report fault to direct support maintenance personnel if condition continues.

Step 3. Check for loose electrical connections or faulty wiring.

Tighten loose connections. Replace wiring if necessary. (Refer to paragraph 5-28)

Table 4-2. Organizational Troubleshooting - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

---

4. COMPRESSOR WILL NOT START - Continued

Step 4. Make continuity check of control circuit to determine whether open circuit exists. (Refer to paragraph 4-24)

Repair open circuit or replace wire.
(Refer to paragraph 4-24)

Step 5. Check continuity across primary winding and across secondary winding of control transformer to see whether windings are good. (Refer to paragraph 4-31)

Replace bad transformer. (Refer to paragraph 4-31).

Step 6. Apply 30 volts AC across side input terminals; check for 24-28 volts DC across output terminals (marked + and -) of rectifier.
(Refer to paragraph 4-30)

Replace bad rectifier. (Refer to paragraph 4-30)

Step 7. Observe operation of time delay relay and check continuity.
(Refer to paragraph 4-25)

Replace bad relay. (Refer to paragraph 4-25)

5 INSUFFICIENT HEATING

Step 1. Check that mode selector switch is in HIGH HEAT position.

Switch to HIGH HEAT position.
Replace bad mode selector Switch.
(Refer to paragraph 4-24)

Step 2. Check that evaporator fan toggle switch is in HIGH SPEED position.

Switch to HIGH SPEED position.
Replace bad evaporator fan speed switch.
(Refer to paragraph 4-24)

Step 3. Check that temperature selector switch is in WARMER position.

Switch to WARMER position.
Replace bad temperature selector switch.
(Refer to paragraph 4-24)

Table 4-2. Organizational Troubleshooting - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

---

5 INSUFFICIENT HEATING - Continued

Step 4. Check that the compressor circuit breaker is in the ON position.

Switch to ON position.
Replace bad compressor circuit breaker.
(Refer to paragraph 4-24)

Section V. ORGANIZATIONAL MAINTENANCE

4-14. MAINTENANCE OF MECHANICAL PARTS

a. Louvers, guards, and controls covered in this section include:

Evaporator Louvers
Panels
Guards
Condenser Air Discharge Louver and Linkage
Fabric Cover
Evaporator Inlet Air Filter
Mist Eliminator
Condensate Drain Tube
Fresh Air Damper and Actuator
Condenser Louver Control

b. Mechanical assemblies and groups of associated components are covered in separate paragraphs.

WARNING

Disconnect air conditioner power supply before doing maintenance work on the mechanical assemblies.

4-15. MAINTENANCE OF ELECTRICAL SYSTEM

a. The electrical system is made up of:

Heater Thermostatic Switch
Heater Elements
Control Module and Components
Junction Box and Components
Transformer
High/Low Pressure Cutout Switches
Evaporator and Condenser Fan Motors
  Run Capacitors
Compressor Start and Run Capacitors
Compressor Start Relay
Wiring Harness
Compressor Wiring

b. Electric assemblies and groups of associated components are covered in separate paragraphs.

WARNING

> Disconnect air conditioner power supply before doing maintenance work on the electrical system.

c. Testing and inspecting the electrical system

(1) Troubleshooting procedures for testing the electrical system to isolate causes of trouble are discussed in Table 4-1. More detailed test information is contained in specific paragraphs about the electrical components.

(2) Use a continuity tester or a multimeter set on low-resistance range to test for continuity.

(3) Use an insulation tester or a multimeter set on a high-resistance range to test for short circuits between the circuit in a component and the outside casing of the component.

(4) When testing an electrical component, check for visible damage, and inspect all wiring in the area for damage or loose connections.

4-16. CANVAS COVER-SERVICE

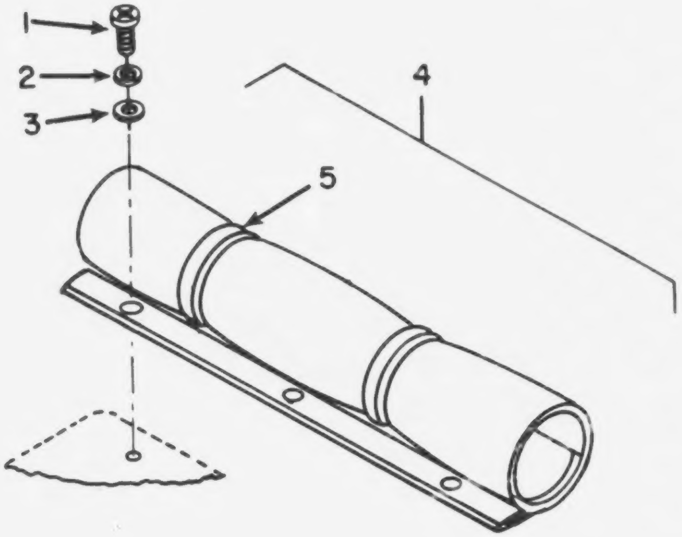
This task covers:

a. Removal
b. Inspection and Cleaning
c. Installation

INITIAL SETUP

Materials/Parts
Cloth, lint free (Item 9, App. E)
Dry cleaning solvent (Item 16, App. E)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power supply before doing maintenance work on the electrical system.	
TOP REAR OF HOUSING		
Removal	a. Remove three screws, (1) three lockwashers (2) and three flat washers (3) securing canvas cover (4) to rear top cover.	



4-16. CANVAS COVER - Continued

LOCATION/ITEM	ACTION	REMARKS
TOP REAR OF HOUSING (Continued)	b. Roll up canvas cover (4) at rear top cover and ties (5). c. Remove canvas cover (4) from top rear cover.	Do not leave rolled up when wet. Spread canvas cover out flat until it is dry.
Inspection and Cleaning	a. Inspect for cuts, rips, tears, and fraying. **WARNING** Clean parts in a well ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly. Dry cleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).	
	b. Inspect for stains, clean with dry cleaning solvent (Item 18, App. E) and lint free cloth.	Do not roll up immediately after cleaning with solvent. Spread canvas cover out flat until it is dry.
Installation	a. Secure with three screws (1), three lockwashers, (2) and three flat washers (3) to rear of top rear cover, roll up and tie.	

4-17. PANELS-SERVICE

This task covers:

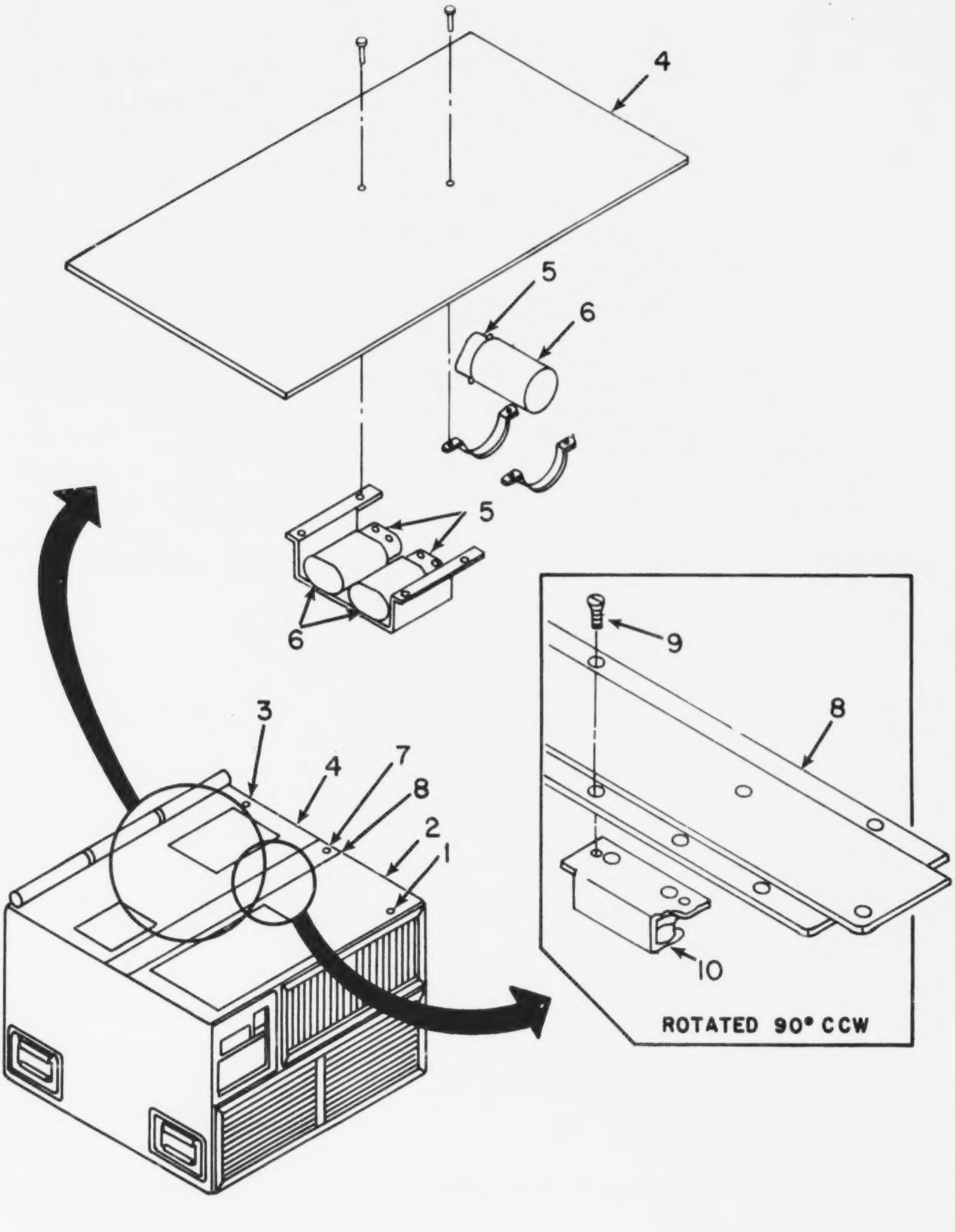
a. Removal
b. Inspection and Cleaning
c. Installation

INITIAL SETUP

Materials/Parts
- Flexible polyurethane Foam, (Item 20, App. E)
- Warm, soapy water
- Filter-kote or oil (Item 17, App. E)
- Cellular Rubber strips (Item 19, App. E)
- Adhesive (Item 18, App.E)-Toluolene (Item, App. E)

Equipment Condition	Para.
Canvas Cover Removed	4-16

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power input connector before doing maintenance work on electrical system.	
REMOVAL 1. Front Top Panel	a. Remove eight screws (1) securing front top cover (2). b. Remove front top cover (2).	
2. Rear Top Panel	a. Remove seven screws (3) securing rear top cover (4). **WARNING** Always ground every capacitor likely to hold a dangerous potential charge. b. Slide rubber boots (5) away from capacitors (6). c. Discharge capacitors (6) using instrument with insulated handle. d. Tag and disconnect leads from capacitors (6).	


ROTATED 90° CCW

4-17. PANELS - Continued

LOCATION/ITEM	ACTION	REMARKS
TOP OF HOUSING (continued)		
REMOVAL (Continued)	e. Remove rear top cover (4).	
3. Center Top Panel	a. Remove two screws (7) securing center top cover (8). b Remove two screws (9) holding the thermostatic heater switch bracket (10) to the cover. Leave the switch in place. c. Remove center top cover (8).	
4. Cleaning.	Clean dirty panels with warm soapy water.	
Installation		
5. Center Top Panel	a. Secure thermostatic heater switch bracket (10) to underside of cover (8) with two screws (9). b. Aline cover (8) and secure with two screws (7).	See para. 4-16.
6. Rear Top Panel	a. Connect leads to capacitors (6) and remove tags. b. Slide rubber boots (5) over capacitor leads. c. Aline cover (4) and secure with seven screws (3). d. Attach canvas cover	See para. 4-16.
7. Front Top Panel	Aline cover (2) and secure with eight screws (1).	

4-18. EVAPORATOR LOUVERS-SERVICE

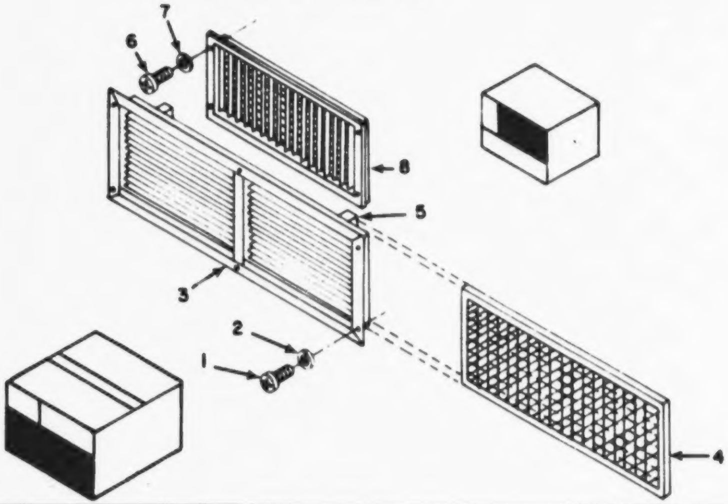
This task covers:

- a. Removal
- b. Cleaning
- c. Installation

INITIAL SETUP

Materials/Parts
Dry cleaning solvent (Item 16, App. E)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power input connector before doing maintenance work on electrical system.	
REMOVAL		
1. Evaporator Inlet Louver	a. Remove eight screws (1) and eight lockwashers (2) securing louver (3) to housing. b. Remove louver (3). c. Remove evaporator air inlet filter (4) from filter clips (5).	
2. Evaporator Outlet Louver	a. Remove six screws (6) and six lockwashers (7) securing louver (8) to housing. b. Remove louver (8).	



4-18. EVAPORATOR LOUVERS - Continued

LOCATION/ITEM	ACTION	REMARKS
CLEAN 3. Evaporator Inlet and Outlet Louvers	a. Inspect louver blades for bends or damage and straighten. b. Inspect for missing or damaged tabs, (9) and filter clips (5). c. Clear obstructions from louver blades using dry cleaning solvent. d. Clean louver blades of obstructions.	Evaporator Inlet Louvers Only.
INSTALLATION 4. Evaporator Outlet Louver	Aline and secure louver (8) to housing using six screws (6) and six lockwashers (7) respectively.	Evaporator Outlet Louver Only.
5. Evaporator Inlet Louver	a. Install evaporator inlet air filter (4) into filter clips (5). b. Aline and secure louver (3) to housing using eight screws (1) and eight lockwashers (2) respectively.	Evaporator Inlet Louver Only.

4-19. EVAPORATOR INLET AIR FILTER-SERVICE/REPLACE

This task covers:

a. Removal
b. Cleaning
c. Installation

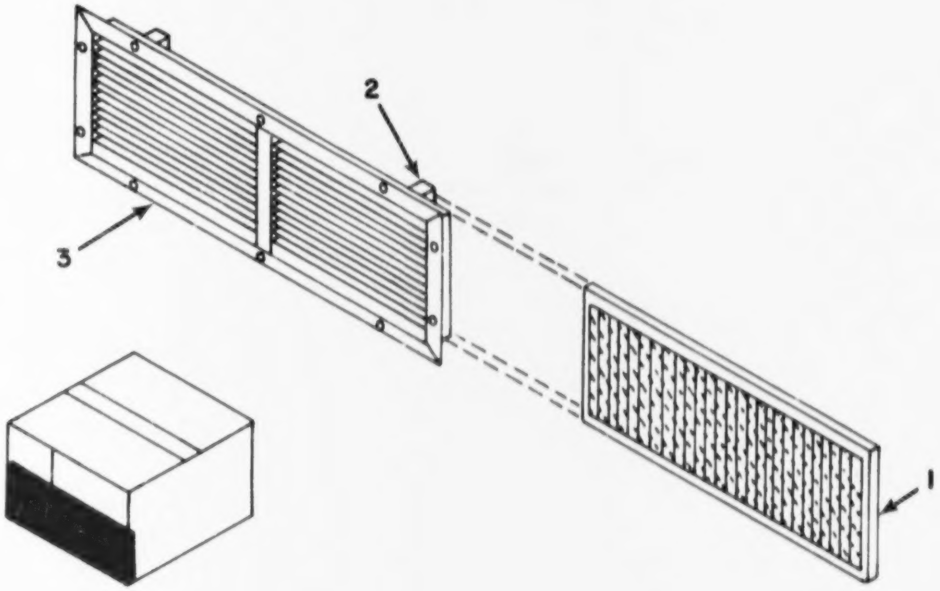
INITIAL SETUP

Equipment Condition Para	Condition Description
4-18	Evaporator inlet louver removed

Materials/Parts
Hose, with running water
Filter-Kote or oil (Item 17, App. E)
Dry cleaning solvent (Item 16, App. E)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power input connector before doing maintenance work on electrical system.	
REMOVAL	Slide air filter (1) out of retaining clips (2).	
	WARNING Clean parts in a well ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly. Dry cleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 58°C)	

4-19. EVAPORATOR INLET AIR FILTER–Continued



LOCATION/ITEM	ACTION	REMARKS
Cleaning	a. Inspect filter (1). Replace damaged filter. Clean with dry cleaning solvent (Item 16, App. E) b. Replace filters having breaks, tears, excess accumulations of dirt or grease, or other major damage. c. Lubricate air filter with Filter–Kote (Item 17, App. E).	
Installation	a. Slide air filter (1) into retaining clips (2) on rear of evaporator inlet louver.	Heed air flow directional arrow on air filter frame.
	b. Install evaporator inlet louver.	Para. 4–18.

4-20. MIST ELIMINATOR - SERVICE/REPLACE/REPAIR

This task covers:

a. Removal
b. Cleaning
c. Repair
d. Installation

INITIAL SETUP

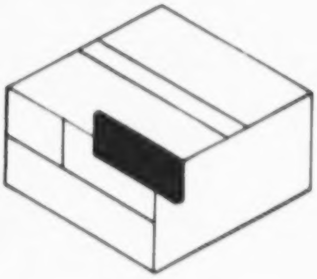
Equipment Condition

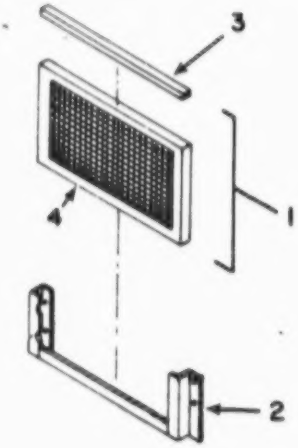
Para	Condition Description
4-17	Front Top Cover removed.

Materials/Parts

Hose, with running water

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power input connector before doing maintenance work on electrical system.	
Removal	Slide mist eliminator (1) up and out of mist eliminator holder (2).	





4-20. MIST ELIMINATOR - Continued

LOCATION/ITEM	ACTION	REMARKS
Cleaning	a. Inspect mist eliminator for dirt, bends, or warped frame. b. Inspect for damage or missing insulation (3) on top of mist eliminator. c. Clean mist eliminator (1) by hosing water through in opposite direction of air flow.	
Repair	a. Replace bent or damaged mist eliminator. b. Replace insulation (3) if it has been damaged or is missing.	
Installation	a. Insert mist eliminator (1) into mist eliminator holder (2).	Heed air flow direction arrow on mist eliminator frame.
	b. Install top cover.	Para. 4-17.

4-21. CONDENSER AIR DISCHARGE LOUVER AND LINKAGE – SERVICE/REPLACE/ADJUST

This task covers:

a.	Removal	d.	Assembly
b.	Disassembly	e.	Installation
c.	Repair & Clean	f.	Adjustment

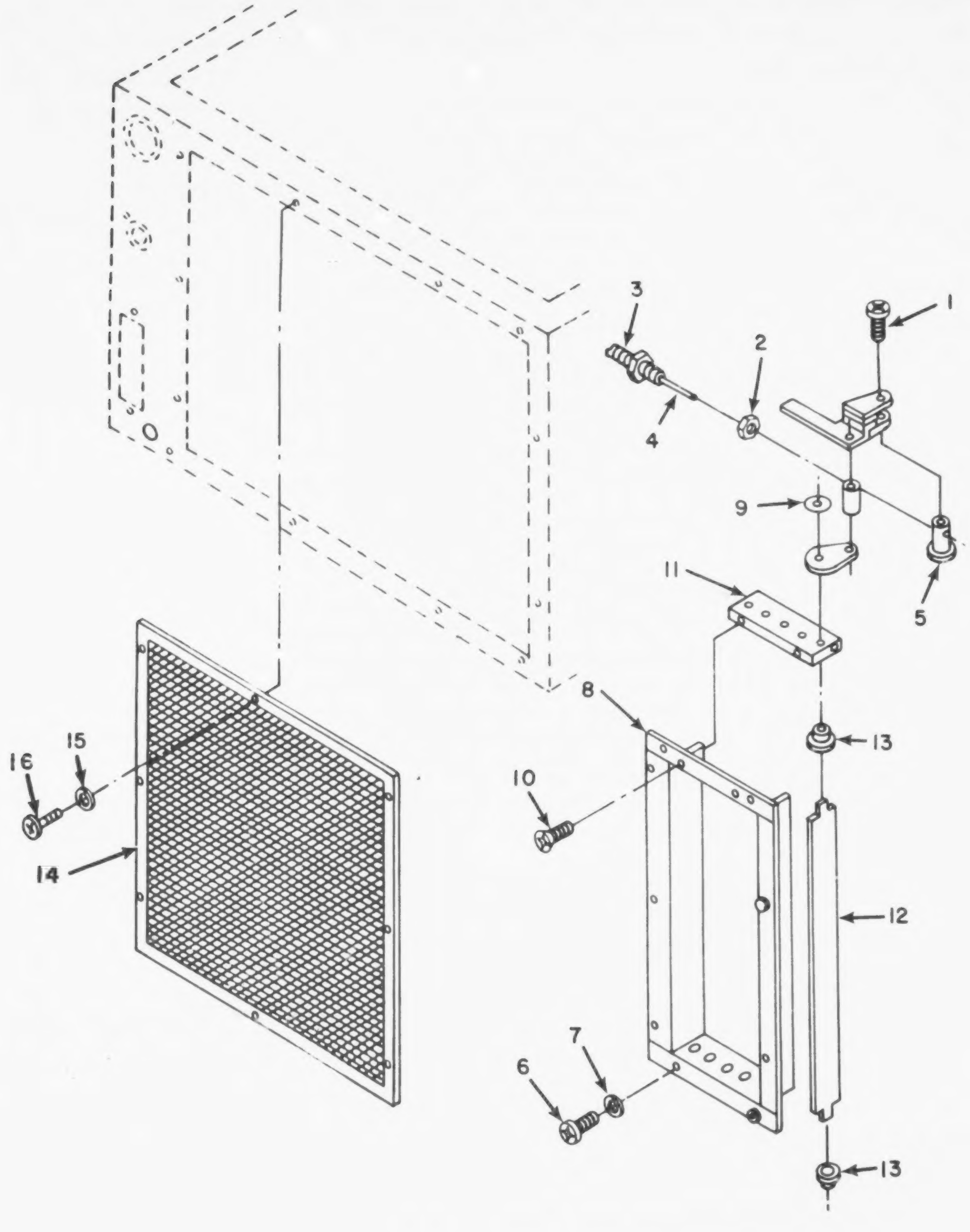
INITIAL SETUP

Equipment Condition Para	Condition Description
4-16	Fabric Cover detached.
4-17	Rear Top cover removed.

Materials/Parts

Dry cleaning solvent (Item 16, App. E)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power input connector before doing maintenance work on electrical system.	
Removal 1. Condenser Guard	Remove condenser guard (14) by removing eight screws (16) and eight lockwashers (15).	
2. Condenser Louver	a. Loosen post screw (1). b. Remove outer sheath retaining nut (2) from control cable sheath (3). c. Pull end of wire (4) from mechanical post (5). d. Remove seven screws (6) and seven lockwashers (7) securing condenser louver assembly (8) to housing. e. Remove condenser louver assembly (8) from housing.	



4-21. CONDENSER AIR DISCHARGE LOUVER AND LINKAGE - Continued

LOCATION/ITEM	ACTION	REMARKS
Disassembly 3. Condenser Louver	a. Remove five push nuts (9). b. Remove two screws (10). c. Remove bearing plate (11). d. Remove louver blades (12) and bearings (13) from louver assembly frame (8).	
Repair & Clean 4. Condenser Louver	a. Replace damaged louver blades, bearing, lever, or insulation. b. Straighten, or replace, bent frame. c. Clean with dry cleaning solvent. **WARNING** Clean parts in a well ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly. Dry cleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 58°C)	
Assembly 5. Condenser Louver	a. Install bearings (13) and louver blades (12) into louver assembly frame (8). b. Install bearing plate (11) to louver assembly frame (8) by securing two screws (10). c. Install five push nuts (9).	

4-21. CONDENSER AIR DISCHARGE LOUVER AND LINKAGE - Continued

LOCATION/ITEM	ACTION	REMARKS
Installation 6. Condenser Louver	a. Place condenser louver assembly (8) in housing.	
	b. Install top and bottom screws (6) and washers (7) finger tight.	
	c. Reconnect control (push-pull) cable (4).	
	d. Install remaining screws (6) and washers (7).	
	e. Attach rear top cover.	See para. 4-17.
	f. Attach fabric cover.	See para. 4-16.
Adjustment	a. Turn off air conditioner and wait four hours, or until air conditioner is at ambient temperature.	
	b. Loosen post screw (1) on mechanical post (5).	
	c. Close condenser louvers (12) and draw wire (4) tight.	
	d. Tighten post screw (1).	
	e. Check to see that louvers (13) are tightly closed when air conditioner is off.	
	f. Assure that all external screws (6) are tight.	
7. Condenser Guard	a. Install condenser guard (14) using eight lockwashers (15) and eight screws (16).	
	b. Attach rear top cover.	See Para. 4-17.
	c. Attach fabric cover.	See Para. 4-16.

4-22. FRESH AIR DAMPER AND ACTUATOR - INSPECT/SERVICE/REPLACE/ADJUST

This task covers:

a. Removal
b. Inspect
c. Cleaning
d. Installation
e. Adjustment

INITIAL SETUP

Equipment Condition

Para	Condition Description
4-17	Top Covers removed.
4-18	Evaporator inlet and outlet louvers removed.

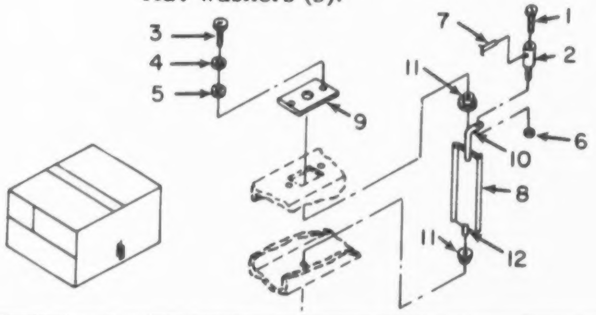
Special Tools

Off-set Phillips Screwdriver.

Materials/Parts

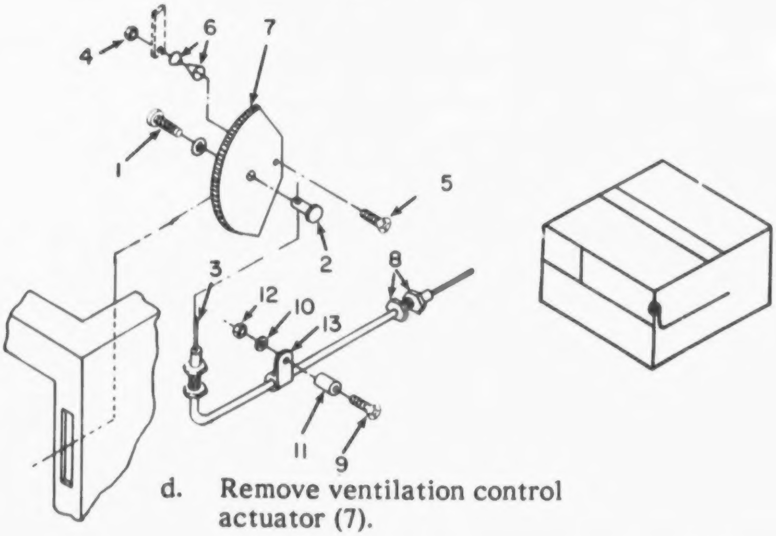
Dry cleaning solvent (Item 16, App. E)
Cloth, Lint free (Item 9, App. E)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power input connector before doing maintenance work on electrical system.	
Removal 1. Fresh Air Ventilation Damper	a. Loosen post screw (1) on mechanical post (2). b. Remove two screws (3), two lock washers (4), and two flat washers (5).	



4-22. FRESH AIR DAMPER AND ACTUATOR - Continued

LOCATION/ITEM	ACTION	REMARKS
Removal - (Continued)		
1. Fresh Air Ventilation Damper-(Cont.)	c. Remove hex nut (6).	
	d. Disconnect push-pull control cable wire (7) from mechanical post (2).	
	e. Lift fresh air ventiliation damper assembly (8) from fresh air duct.	
	f. Remove the damper cover (9) from the upper damper arm (10).	
	g. Remove the top & bottom damper bearings (11) from the upper damper arm (10) and the lower damper arm (12).	
2. Ventilation Control Actuator	a. Loosen post screw (1) on mechanical post (2).	
	b. Disconnect push-pull control cable wire (3) from mechanical post (2).	
	c. Remove nut (4), screw (5), and two spring washers (6) from center hole of actuator (7) and housing.	



d. Remove ventilation control actuator (7).

4-22. FRESH AIR DAMPER AND ACTUATOR - Continued

LOCATION/ITEM	ACTION	REMARKS
Removal - (Continued)		
3. Push-Pull Control Cable	a. Remove two outer sheath retaining nuts (8) on push-pull control cable (3). b. Remove screw (9), lockwasher (10), spacer (11), nut (12), and clamp (13). c. Remove push-pull control cable (3) from unit.	
Inspection		
4. Fresh Air Ventilation Damper	a. Inspect ventilation damper for bends and breaks. b. Inspect rubber seal for damage. c. Inspect damper plate for bending or warping. d. Inspect bearing for cracks and excessive wear.	
5. Ventilation Control Actuator	Inspect for cracks, chips or warps.	
6. Push-Pull Control Cable	a. Pull control wire from sheath. b. Inspect wire and sheath for fraying, kinking, or breaks.	
Clean		
7. Fresh Air Ventilation Damper	a. Wipe off dirt with clean dirt free cloth, (Item 9, App. E). For stubborn dirt, wash with warm soapy water and lint free cloth.	

4-22. FRESH AIR DAMPER AND ACTUATOR - Continued

LOCATION/ITEM	ACTION	REMARKS
Service - (Continued)		
7. Fresh Air Ventilation Damper (Continued)	**WARNING** Dry cleaning solvent (P-D-680), used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near flame or excessive heat. b. Carefully scrape away all adhesive from damper cover and opening, and clean with dry cleaning solvent Item 16, App. E).	
8. Push-Pull Control Cable	a. Clean control cable wire and sheath using dry cleaning solvent (Item 16, App. E) and lint free cloth (Item 9, App. E). b. Slide control wire into sheath.	
9. Ventilation Control Actuator	a. Wipe off loose dirt using lint free cloth (Item 9, App. E). For stubborn dirt, wash with warm soapy water using lint free cloth (Item 9, App. E) and rinse.	
Repair		
10. Fresh Air Ventilation Damper	a. Straighten damper and cover if possible. Replace if necessary. b. Remove and replace cellular rubber seals on damper if necessary using cellular rubber strips (Item 19, App. E) acid swab brush, and adhesive (Item 18, App. E). c. Replace vent damper bearings as necessary.	
11. Push-Pull Control Cable	Straighten out minor kinks and bends in control wire and sheath or replace as necessary.	
12. Ventilation Control Actuator	Straighten if possible. Replace as necessary.	

4-22. FRESH AIR DAMPER AND ACTUATOR - Continued

LOCATION/ITEM	ACTION	REMARKS
Installation 13. Fresh Air Ventilation Damper	a. Install the top and bottom damper bearings (11) on to lower damper arm (12), and the upper damper arm.	
	b. Slide damper cover (9) over the upper damper arm (10).	
	c. Install mechanical post (2) and screw (1) to damper arm using locknut (6).	
	d. Apply thin bead of adhesive (Item 18, App. E) around damper cover opening.	
	e. Install damper (8).	
	f. Slide damper cover (9) into position and firmly press down to ensure good seal.	
	g. Slide push-pull control cable wire (7) into mechanical post (2).	
	h. Install two screws (3), two lock washers (4), and two flat washers (5) into damper cover and tighten.	
	i. Tighten screw (1) of mechanical post (2) atop upper damper arm (10).	
14. Push-Pull Control Cable	a. Slide control cable (3) through housing bulkhead.	
	b. Slide two retaining nuts (8) over control cable wire ends (3).	
	c. Install clamp (13) with screw (9), spacer (11), lockwasher (10), and nut (12) to bulkhead.	
	d. Slide control cable wire ends into mechanical posts (2).	
	e. Tighten control cable retaining nuts (8).	
	f. Tighten screws (1) to mechanical posts (2).	

4-22. FRESH AIR DAMPER AND ACTUATOR - Continued

LOCATION/ITEM		ACTION	REMARKS
Service - (Continued)			
15. Ventilation Control Actuator	a.	Slide control actuator (7) into position on unit.	
	b.	Install screw (5), two spring washers (6) and nut (4) that hold control actuator (7) in position.	
	c.	Slide push-pull control cable wire (3) into mechanical post (2).	
	d.	Tighten screw (1) to mechanical post (2).	
Adjustment	a.	Position control actuator (7) to fully closed position.	
	b.	Loosen screw (1) from mechanical post (2) of fresh air damper.	
	c.	Position fresh air damper to fully closed position by hand while looking down vent housing from evaporator fan motor compartment with flashlight.	
	d.	Tighten screw (1) on mechanical post (2).	
	e.	Shine flashlight into fresh air damper screen side of unit (read side) while looking into vent housing from evaporator fan motor compartment. Ensure no light can be seen around edges of damper seal. If fails, repeat adjustment procedure. If fails again, Service or Replace fresh air damper as necessary.	
	f.	Install evaporator inlet and outlet louvers.	See paragraph 4-18.
	g.	Install top covers.	See paragraph 4-17.

4-23. CONDENSER DRAIN TUBE - INSPECT/SERVICE/REPLACE

This task covers:

a.	Removal	d.	Assembly
b.	Disassembly	e.	Installation
c.	Cleaning		

INITIAL SETUP

Equipment Condition Para	Condition Description
4-17	Front top cover removed.
4-18	Evaporator inlet louver removed.
4-20	Mist Eliminator removed.

Materials/Parts
Water, warm soapy
wire, soft 10-12 gage

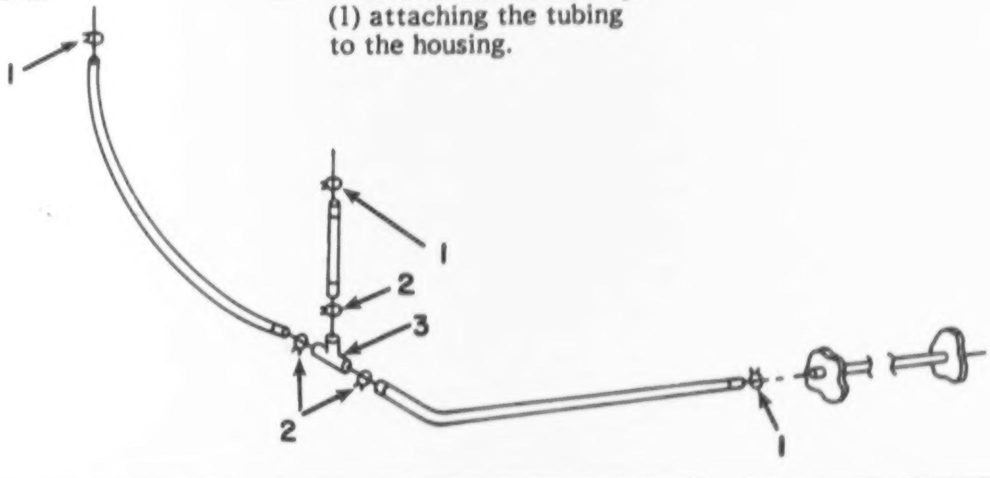
LOCATION/ITEM	ACTION	REMARKS

WARNING

Disconnect air conditioner power input connector before doing maintenance work on electrical system.

Removal

a. Loosen three tube clamps (1) attaching the tubing to the housing.



4-23. CONDENSER DRAIN TUBE - Continued

LOCATION/ITEM	ACTION	REMARKS
Removal (Continued)	b. Remove drain tube assembly from inside evaporator inlet compartment.	
Disassembly	Remove three clamps (2) at tee fitting (3).	
Cleaning	a. Clean tubing using warm soapy water or replace.	
	b. Clear obstructions from drains at bottom of evaporator compartment using soft wire.	Under mist eliminator.
	c. Clear obstructions from drain outlet using soft wire.	Insert from evaporator drain opening.
	d. Replace damaged tubing, tee, pipe plug, mist eliminator, or hose clamps as necessary.	
Installation	a. Reassemble tubing and tee (3) using three clamps (2).	
	b. Install drain tube assembly on evaporator drains using three hose clamps (1).	
	c. Install mist eliminator.	See para. 4-20.
	d. Aline and install front top cover.	See para. 4-17.
	e. Install evaporator inlet louver.	See para. 4-18.

4-24. CONTROL MODULE - REPAIR/REPLACE

This task covers:

a. Removal
b. Disassembly
c. Repair
d. Inspection
e. Test
f. Replacement
g. Reassembly
h. Installation

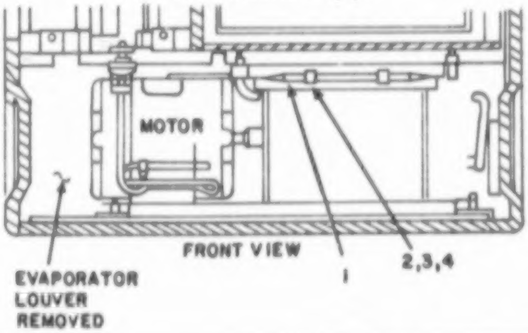
INITIAL SETUP

Equipment Condition

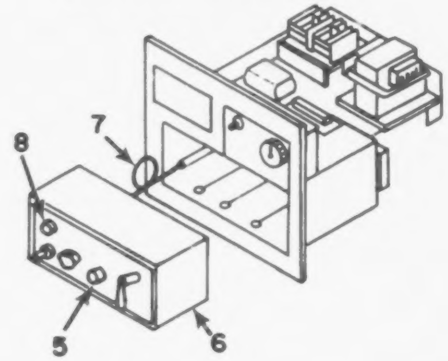
Para	Condition Description
4-18	Evaporator inlet louver removed.

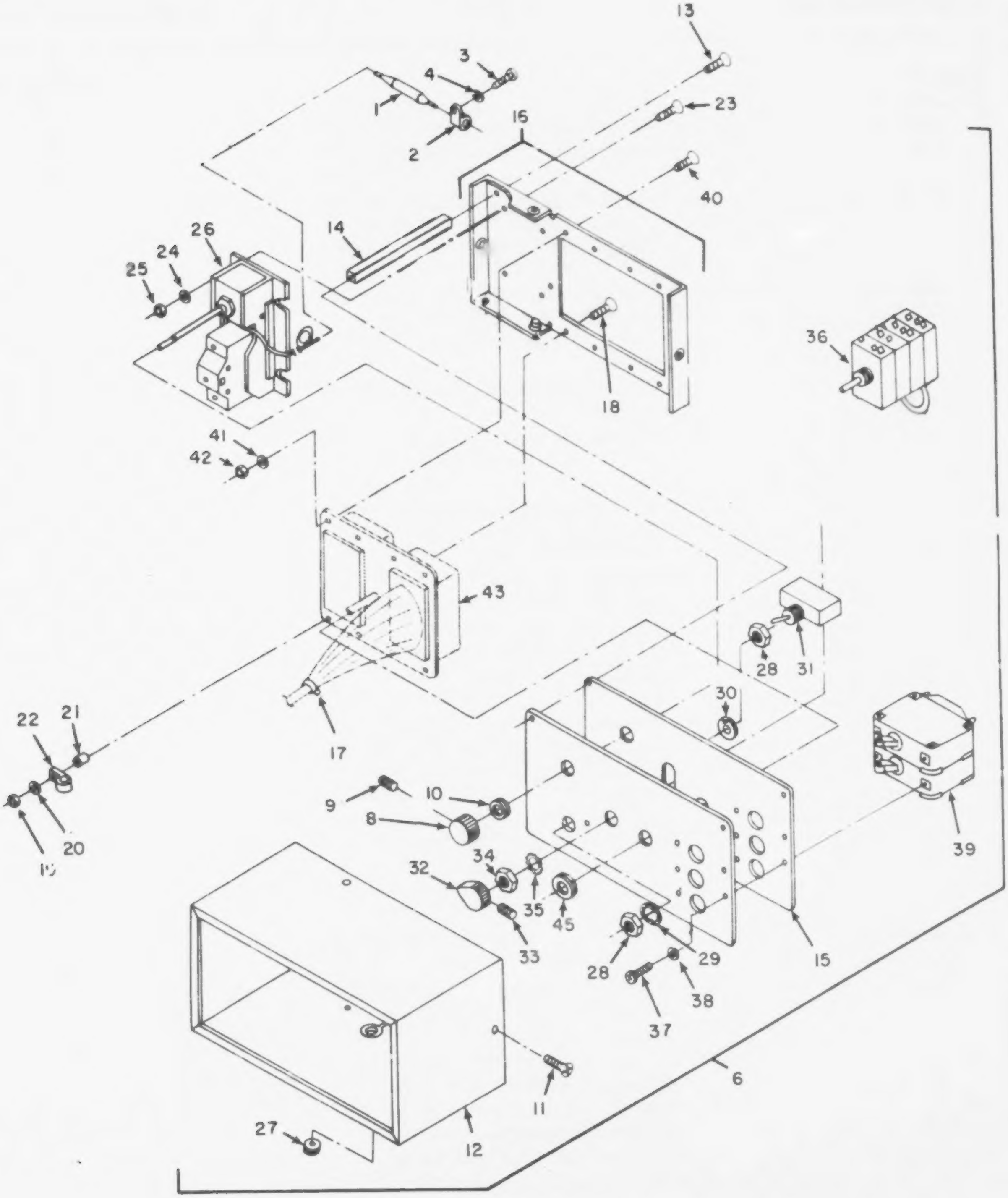
Test Equipment
Multimeter

Materials/Parts
Solder (Item 2, App. E)
Flux (Item 15, App. E)

LOCATION/ITEM	ACTION	REMARKS
Removal	**WARNING** Disconnect power from air conditioner before removing control module.	
1. Control Module	a. Remove temperature selector switch sense bulb (1) from top of evaporator fan housing by removing two clamps (2) attached with two screws (3) and two lockwashers (4).  MOTOR FRONT VIEW 1 2,3,4 EVAPORATOR LOUVER REMOVED	Take care not to break or kink sensing line (7) while removing from mounting place

4-24. CONTROL MODULE – Continued

LOCATION/ITEM	ACTION	REMARKS
Removal – (Continued) 1. Control Module	b. Turn connector post (5) counter-clockwise until post is disengaged.	
		
	c. Pull control module (6) straight out of junction box.	
	d. Carefully pull temperature sensing line (7) and bulb (1) through slot in bottom of junction box.	
Disassembly 2. Control Module	a. Remove temperature control switch knob (8) by loosening hex set screw (9) and nut (10).	
	b. Remove four screws (11) attaching cover (12) to frame and slide cover (12) from module.	
	c. Remove three screws (13) attaching frame posts (14) that hold front (15) and back (16) plates together.	
	d. Pull front (15) and back (16) plates apart until connector posts (14) clear front (15) plate.	
	e. Remove wire ties (17) from wires as required.	



4-24. CONTROL MODULE - Continued

LOCATION/ITEM	ACTION	REMARKS
Repair 3. Control Module Cover	a. Remove nicks, dents or deformation if minor. b. Prime and paint as necessary.	
4. Designation Plate	a. Remove dents or deformation if minor. Replace if major. b. Replace if illegible.	
5. Front and Back Plate	a. Remove dents or deformation if minor. Replace if major. b. Replace if cracked.	
6. Frame Posts	a. Straighten posts if bend is minor. b. Replace if bend is major.	
Inspection 7. Temperature Selector Switch	a. Turn temperature control knob from stop to stop to ensure smooth operation. Replace if binding occurs. b. Inspect temperature control knob for chips, cracks, or indicator line cannot be readily seen. Replace if found. c. Inspect sensor bulb and line for kinks, excessive bends, nicks, breaks, or cuts. Replace if found. d. Inspect sensor line grommet (6) for tears, cracks, and general deterioration. Replace if found or missing.	
8. Evaporator Fan Speed Switch	a. Inspect contacts. Replace switch if damaged. b. Inspect contact leads for damage or corrosion. Clean if minor or replace if major. c. Inspect wiring for breaks or damage. Replace if found. d. Inspect switch for distinct click when changing positions. Replace switch if not found.	

4-24. CONTROL MODULE - Continued

LOCATION/ITEM	ACTION	REMARKS
Inspection-Continued		
9. Mode Selector Switch	a. Inspect selector knob for chips, stripping out, cracks, or damage. Replace if found.	
	b. Inspect contacts. Replace switch if damaged.	
	c. Inspect wiring for breaks or damage. Replace if found.	
	d. Inspect for distinct click when changing positions. Replace switch if not found.	
10. Compressor Circuit Breaker	a. Inspect toggle for chips, cracks, or damage. Replace switch if found.	
	b. Inspect contacts. Replace switch if damaged.	
	c. nspect wiring for breaks or damage. Replace if found.	
	d. Inspect for distinct click and engagement of switch when placed in ON position. Replace if found.	
	e. Inspect for smooth motion to OFF position. Replace if not found.	
11. Connector With Leads (Wiring)	a. Inspect contacts. Replace connector if damaged.	
	b. Inspect wiring for breaks, fraying, discoloration, or damage. Replace if found.	
	c. Inspect soldered connections for breaks or damage. Repair or replace if found.	
	d. Inspect pins for bending or corrosion. Straighten bent pins if possible. Clean minor corrosion. Replace if necessary.	
	e. Inspect electrical contacts for corrosion. Replace or clean as necessary.	

4-24. CONTROL MODULE - Continued

LOCATION/ITEM	ACTION	REMARKS
Test 12. Temperature Selector Switch	a. Tag and disconnect leads.	
	b. Check for continuity using a multimeter on the lowest ohm setting. Place probes on the red and blue terminals.	See Figure F-2.
	c. Turn switch to COOLER (fully counter-clockwise). No continuity should exist.	Switch operates in temperature range of 94°F to 56°F (34°C to 13°C). If out of range, immerse bulb in water.
	d. Turn switch to WARMER (fully clockwise). Meter should show continutiy as setting becomes higher than bulb temperature.	
	e. Place multimeter probes on red and yellow terminals.	
	f. Turn switch to WARMER (fully clockwise). No continuity should exist.	
	g. Turn switch to COOLER counter-clockwise). Meter should show continuity as setting becomes lower than bulb temperature.	
	h. Replace if fails above indications.	
13. Evaporator Fan Speed Switch	a. Tag and disconnect leads.	
	b. Check for continuity in low and high speed position using a multimeter on the lowest ohm setting.	See Figure F-2.
	c. In low speed position, there should be continuity between contacts A2 to A3, and B2 to B3. No continuity should exist between A1 to A2, and B1 to B2.	
	d. In high speed position, there should be continuity between B1 to B2, and A1 to A2. No continuity should exist between B2 to B3, and A2 to A3.	
	e. Replace if fails test.	

4-24. CONTROL MODULE - Continued

LOCATION/ITEM	ACTION	REMARKS
Test 14. Mode Selector Switch	a. Tag and disconnect leads. b. Check for continuity using a multimeter and switch position chart shown below. With switch position closed, continuity should be indicated. With switch position open, no continuity should be indicated. Check between each set of contacts and at each switch position. c. Replace if fails test.	See Figure F-2.

POSITION	FUNCTION	SWITCH SECTIONS AND TERMINALS CONNECTED			
		S1A	S1B	S1C	S1D
1	HEAT (HIGH)	12 AND 1A	21 AND 2C 22 AND 2B	31 AND 3C 32 AND 3A	41 AND 4C
2	HEAT (LOW)	12 AND 1A	21 AND 2C 22 AND 2B	—	—
3	OFF	—	—	—	—
4	VENT	—	21 AND 2C 22 AND 2B	31 AND 3C	—
5	COOL	12 AND 1B 11 AND 1D	21 AND 2C 22 AND 2B	31 AND 3C	NOT USED

LOCATION/ITEM	ACTION	REMARKS
15. Compressor Circuit Breaker	a. Tag and disconnect leads. b. Check for continuity in ON position between contacts A1 to A2, B1 to B2, and C to NO. Continuity should exist. No continuity should exist between these contacts in the off position. c. Replace if fails test.	See Figure F-2.
16. Control Module Wiring Harness	a. Tag and disconnect leads. b. Check for continuity by touching the test probes of a continuity tester or multimeter set on low-resistance range, to the ends of wire and/or the corresponding pin of connector.	See Figures F-1 and F-2

4-24. CONTROL MODULE - Continued

LOCATION/ITEM	ACTION	REMARKS
Test-Continued 16. Control Module Wiring Harness-Continued	c. Replace pins and wire if not found.	
Replacement 17. Temperature Selector Switch	a. Remove screw (18), nut (19), flat washer (20), and spacer (21) from capillary clamp (22). b. Remove clamp (22). c. Remove four screws (23), four flat washers (24), and four nuts (25) attaching switch to back plate (13). d. Remove switch (26) from control module. e. Clean contacts. Replace switch if contacts are damaged. f. Replace if failed test. g. Replace grommet (27) if damaged. h. Reassemble into control module if passed test.	NOTE: Switches are not repairable and may only be replaced.
18. Evaporator Fan Speed Switch	a. Remove two mounting nuts (28), lockwasher (29), and lockring (30). b. Slide switch (31) out backside of front panel (15). c. Clean contacts. Replace switch if contacts are damaged. d. Replace if failed test. e. Reassemble into control module if passed test.	
19. Mode Selector Switch	a. Remove selector knob (32) by loosening set screw (33). b. Remove mounting nut (34) and lockwasher (35). c. Slide switch (36) through back of front plate (15). d. Clean contacts. Replace switch if contacts are damaged. e. Replace if failed test. f. Reassemble into control module if passed test.	

4-24. CONTROL MODULE - Continued

LOCATION/ITEM	ACTION	REMARKS
Removal Continued		
20. Compressor Circuit Breaker	a. Remove pin and middle section of throw switch.	
	b. Remove four screws (37), and four flat washers (38) securing switch to front plate (15).	
	c. Slide switch (39) through back of front plate (15).	
	d. Clean contacts. Replace switch if contacts are damaged.	
	e. Replace if failed test.	
	f. Reassemble in control module if passed test.	
21. Control Module Wiring Harness	a. Remove screw (18),flat washer (20) post spacer (21), locknut (19), and clamp (22) securing temperature selector switch sensing line to back plate (16).	
	b. Remove seven screws (40), seven flat washers (41), and seven locknuts (42) securing connector plug (43) to back plate (16).	
	c. Remove connector with leads (43) from back plate (16).	
	d. Replace wires if damaged or failed test.	
	e. Desolder wire from connector pin.	
	f. Measure old wire and cut new wire to that length.	
	g. Strip insulation from wire ends.	
	h. Crimp required contacts on appropriate wire ends.	
	i. Print wire identification number on shrink sleeving and shrink on appropriate wire end.	

4-24. CONTROL MODULE – Continued

LOCATION/ITEM	ACTION	REMARKS
Removal Continued 21. Control Module Wiring Harness-Continued	j. Solder wire to appropriate connector pin.	
	k. Straighten and clean any bent or dirty pins on connector plug.	
	l. Replace connector plug with leads	
Installation 22. Control Module Wiring Harness	a. Install connector with leads (43) into back plate (16).	
	b. Connect leads and disconnect tags.	
	c. Install seven screws (40), seven flat washers (41) and seven locknuts (42) and secure connector to back plate.	
	d. Install screw (18), flat washer (20), post spacer (21), locknut (19), and clamp (22) and secure temperature selector switch sensing line to back plate (16).	
23. Compressor Circuit Breaker	a. Slide switch (39) into front plate (15) through backside.	
	b. Attach switch using four screws (37) and four flat washers (38).	
	c. Aline middle section of throw switch and insert pin.	
	d. Connect leads and remove tags.	
24. Mode Selector Switch	a. Slide switch (36) into front plate (15) through backside.	
	b. Attach switch (36) using lockwasher (35) and mounting nut (34).	
	c. Install selector knob (32) and tighten set screw (33).	
	d. Connect leads and remove tags.	
25. Evaporator Fan Speed Switch	a. Slide switch (31) into front panel through backside.	
	b. Attach switch (31) using lockring (30), lockwasher (29), and two mounting nuts (28).	
	c. Connect leads and remove tags.	

4-24. CONTROL MODULE – Continued

LOCATION/ITEM		ACTION	REMARKS
Installation			
26. Temperature Selector Switch	a.	Attach switch (26) to back plate (16) using four screws (23), four flat washers (24), and four nuts (25).	
	b.	Install capillary tube clamp on capillary tube.	
	c.	Attach capillary tube clamp (22) to back plate using screw (18), flat washer (20), lock nut (19), and spacer (21).	
27. Control Module	a.	Add wire ties (17).	
	b.	Push connector post through front plate pressing on front and back plates.	
	c.	Attach three frame posts (14) with three screws (13).	
	d.	Attach temperature control switch knob (8) by tightening hex setscrew (9).	
	e.	Slide cover (12) over module and attach frame to cover with four screws (11).	
28. Control Module	a.	Carefully push sensing bulb and line (7) through slot in bottom of junction box.	
	b.	Push control module (6) straight into junction box.	
	c.	Turn connector post screw (5) clockwise until post is fully engaged.	
	d.	Attach temperature selector switch bulb (1) atop evaporator fan housing with two clamps, (2) two lockwashers (4), and two screws (3).	
	e.	Install evaporator inlet louver	See para 4-18.
	f.	Connect power.	

4-25. JUNCTION BOX - INSPECT/REPAIR/REPLACE

This task covers:

a.	Removal	c.	Repair
b.	Inspection	d.	Installation

INITIAL SETUP

Equipment Condition

Para	Condition Description
4-17	Top Front Cover removed.
4-18	Evaporator Inlet Louver removed.
4-24	Control Module removed.

Test Equipment

Multimeter or Continuity Tester

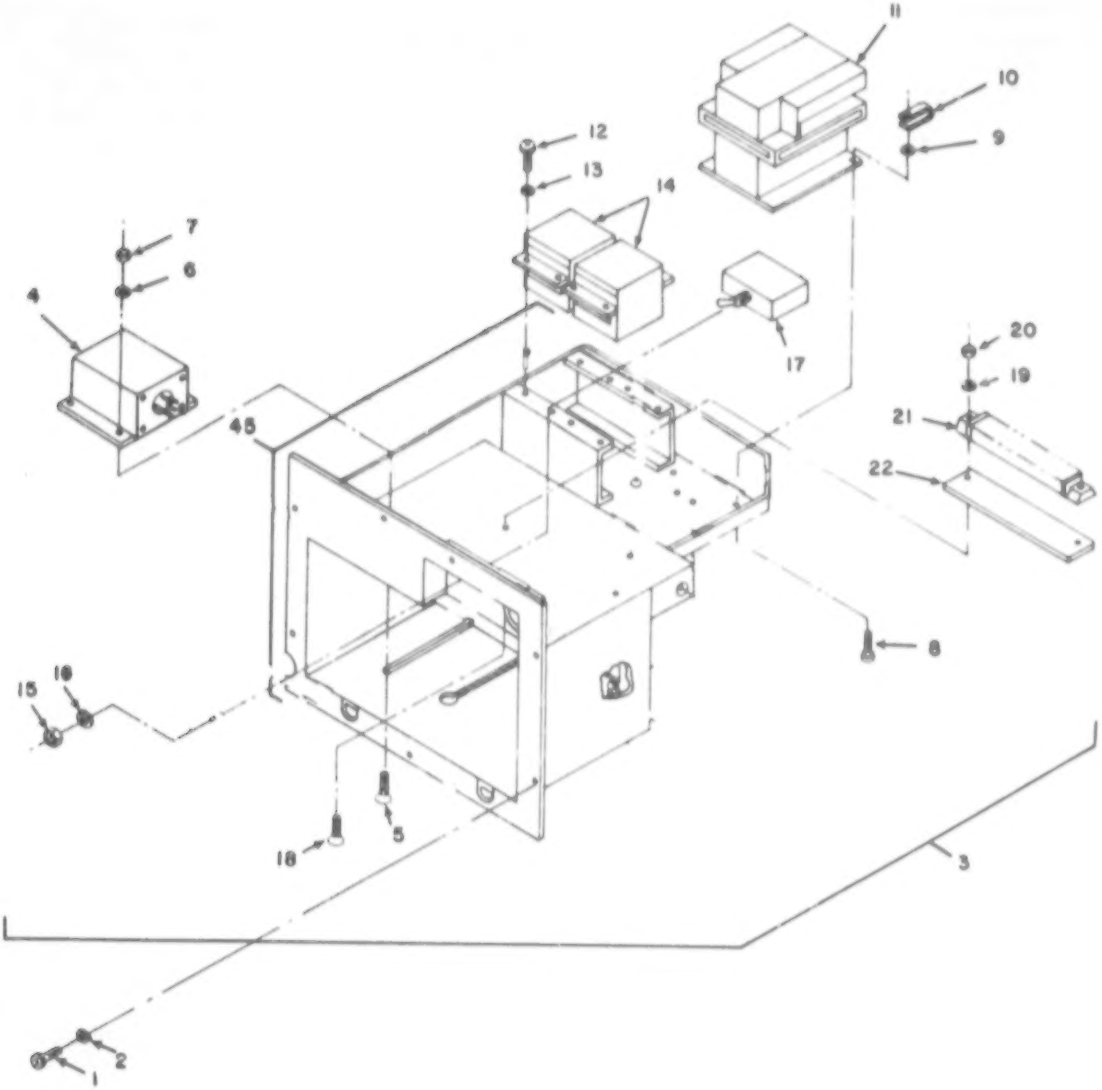
Variable Voltage Power Source (AC/DC)

Materials/Parts

Solder (Item 2, App. E)

Flux (Item 15, App. E)

LOCATION/ITEM	ACTION	REMARKS
Removal 1. Junction Box	**WARNING** Disconnect air conditioner power supply before doing maintenance work on the electrical system.	
	a. Remove seven screws (1) and seven lockwashers (2) that secure the junction box to the housing.	
	b. Partially remove the junction box by pulling it forward and out of the air conditioner.	Support the junction box to relieve the strain on wiring.



4-25. JUNCTION BOX - Continued

LOCATION/ITEM		ACTION	REMARKS
Removal - (Continued) 1. Junction Box - (Continued)	c.	It is not necessary to remove junction box completely from unit.	Most repairs and replacements can be made without removing junction box completely.
Inspection 2. Junction Box	a.	Inspect junction box for damage.	
	b.	Inspect all designation part markings for illegibility.	
	c.	Inspect all designation plates and instruction plates for damage and illegibility.	
	d.	Replace damaged designation markings, instruction plates and designation plates.	
	e.	Replace junction box if damaged enough to prevent normal operation of air conditioner.	
3. Time Delay Relay (K1) Heater Relay (K2) Compressor Motor Relay (K3) Condenser Fan Motor Relay (K4)	a.	Inspect relays for any external damage to housing or contacts.	
	b.	If damaged enough to prevent normal operation of relay, replace relay.	
4. Control Circuit Breaker (CB2)	a.	Inspect control circuit breaker for external damage.	
	b.	Inspect toggle for distinct click and engagement of switch when placed in ON or OFF positions.	
	c.	Inspect contacts for damage.	
	d.	Replace circuit breaker if damaged to prevent normal operation.	

4-25. JUNCTION BOX – Continued

LOCATION/ITEM		ACTION	REMARKS
Inspection – (Continued)			
5. Terminal Board (TB1) and Marker Strip	a.	Inspect terminal board (TB1) for dents, breaks, nicks or damaged terminals.	
	b.	If unreparable, replace terminal board.	
	c.	Inspect marker strip for illegibility or damage.	
	d.	Replace marker strip if damaged.	
6. Time Delay Relay (K1)	a.	Tag and disconnect wire leads except for jumper wire between terminals 1 and 2.	See F-1 and F-2.
	b.	Use a continuity tester or a multimeter set on the lowest ohms scale on relay contacts 1(+) to 5(-) and 2 to 4. Continuity should exist.	
	c.	Continuity should not exist between relay contacts 2 to 3.	
	d.	Set multimeter at appropriate dc voltage scale. Apply 24±5 volts dc power across terminals 1 and 5. Voltage indicated should be 24±5 volts dc. After approximately a 30 second time delay, voltages at terminals 1 & 3 should be 24 volts ±5 volts DC. If not replace.	
	e.	Replace if fails test.	
7. Heater Relay (K2), Compressor Motor Relay (K3) Condenser Fan Motor Relay (K4)	a.	Tag and disconnect wire leads.	
	b.	Use a continuity tester or a multimeter, set on the lowest ohm to check continuity between terminals A1 to A2, B1 to B2, and C1 to C2. All contacts should be open. If there is continuity, replace the relay.	See F-1 and F-2

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4-25. JUNCTION BOX - Continued

LOCATION/ITEM	ACTION	REMARKS
Inspection - (Continued)		
7. Heater Relay (K2), Compressor Motor Relay (K3), Condenser Fan Motor Relay (K4)-(Continued)	c. Check continuity between terminals X1 and X2. If there is no continuity, the coil is open. Replace the relay. d. Apply 24 volts dc across terminals X1 and X2 and repeat continuity checks between terminals A1 and A2, B1 and B2, and C1 and C2. All three contacts should be closed. If there is no continuity, replace the relay.	
8. Control Circuit Breaker	a. Using a continuity tester or a multimeter set on the lowest ohms scale, check continuity between terminal contacts 1 and 2. b. In the OFF position, no continuity should exist. c. In the ON position, continuity should exist. d. Replace if fails test.	See F-1 and F-2.
Repair		
9. Junction Box	a. Repair or straighten sheet metal parts. b. Tag and disconnect the leads from components to be replaced	Disassembly is limited to replacement if individual components.

4-25. JUNCTION BOX - Continued

LOCATION/ITEM		ACTION	REMARKS
Repair (Continued)			
10. Time Delay Relay (K1)	a.	Remove the time delay relay (K1) (4) from the junction box by removing four screws (5), four flat washers (6), and four nuts (7).	
	b.	Install replacement time delay relay (K1) on the junction box (3).	
	c.	Secure relay (4) to junction box (3) with four screws (5), four flat washers (6), and four nuts (7).	
11. Heater Relay (K2)	a.	Remove four screws (8), four flat washers (9) and four nuts (10).	
	b.	Remove the heater relay (K2) (11) from the junction box (3).	
	c.	Install replacement heater relay (K2) and secure relay (11) with four screws (8), flat washers (9) and four nuts (10).	
12. Compressor Motor Relay (K3) and Condenser Fan Relay (K4)	a.	Remove four screws (12) and four lockwashers (13).	
	b.	Remove compressor motor relay (K3) (14) or condenser fan motor relay (K4) (14) as required.	
	c.	Install replacement relay (K3 or K4) in junction box (3).	
	d.	Secure relay with four screws (12) and four lockwashers (13).	
13. Control Circuit Breaker (CB2)	a.	Remove the circuit breaker mounting nut (15) and lockwasher (16) from front of the junction box and pull the circuit breaker (17) to the rear of the junction box (3).	

4-25. JUNCTION BOX - Continued

LOCATION/ITEM		ACTION	REMARKS
Repair (Continued)			
13. Control Circuit Breaker (CB2) - (Continued)	b.	Install replacement control circuit breaker (17) (CB2) through opening in junction box (3).	
	c.	Install the circuit breaker mounting nut (15) and lockwasher (16) to secure circuit breaker (17).	
14. Terminal Board (TB1) and Marker Strip	a.	Remove two screws (18), two flat washers (19) and two nuts (20).	
	b.	Remove terminal board (TB1) (21) and marker strip (22) from junction box (3).	
	c.	Install replacement terminal board (TB1) (21) and marker strip (22) on junction box (3).	
	d.	Secure to junction box using two screws (18), two flat washers (19) and two nuts (20).	
Installation			
15. Junction Box	a.	Carefully install junction box in housing and secure with seven screws (1) and seven lockwashers (2).	
	b.	Install the control module.	See para. 4-24.
	c.	Install evaporator inlet louver	See para. 4-18.
	d.	Install top front cover.	See para. 4-17.

4-26. JUNCTION BOX WIRING HARNESS - INSPECT/TEST/REPAIR/REPLACE

This task covers:

a. Inspection
b. Removal
c. Test
d. Repair
e. Installation

INITIAL SETUP

Equipment Condition

Para	Condition Description
4-17	Top Covers removed.
4-18	Evaporator Inlet Louver removed.
4-24	Control Module removed.
4-25	Junction Box partially removed.

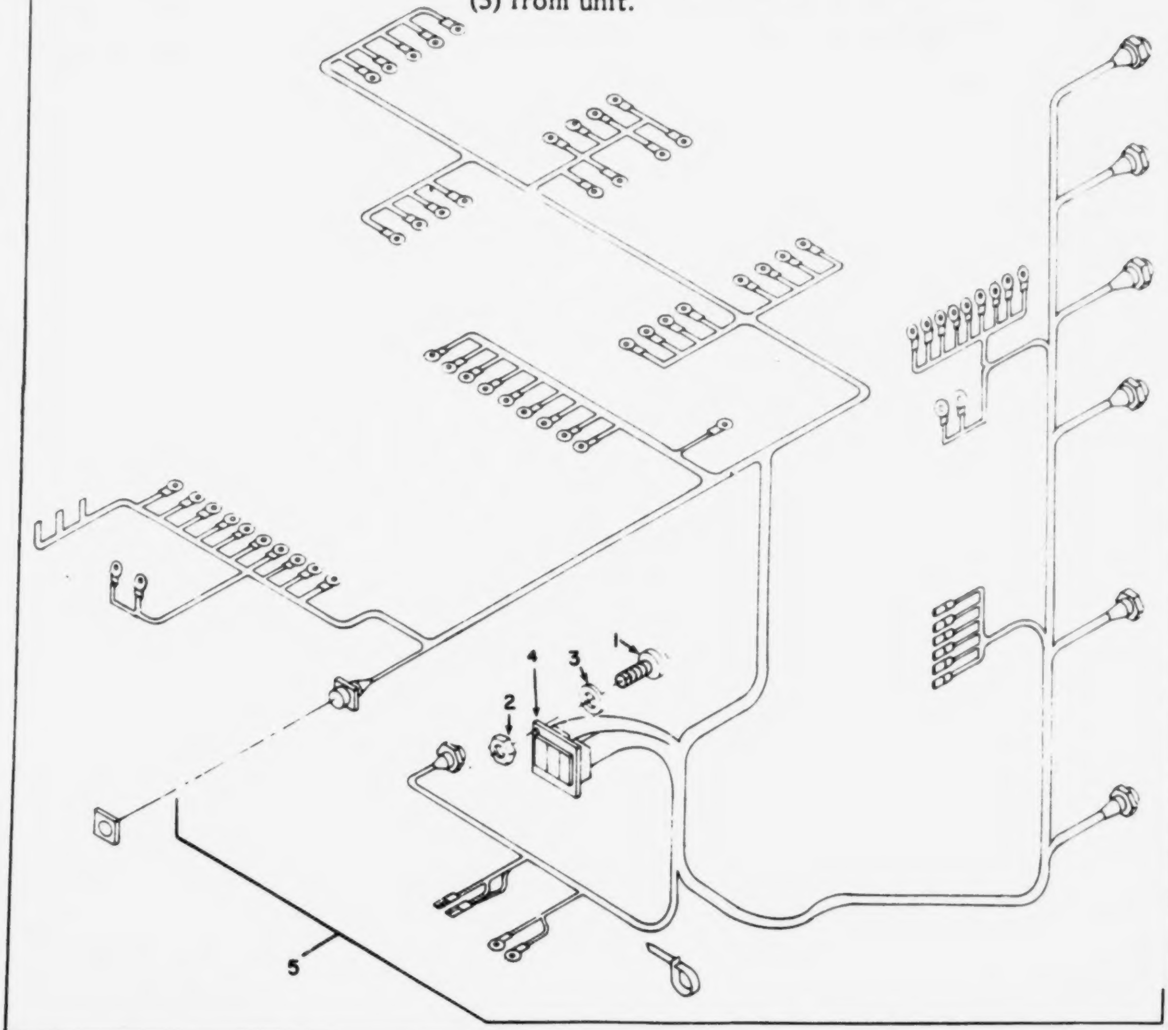
Test Equipment
Multimeter
Continuity Tester

Materials/Parts
Solder (Item 2, App. E)
Flux (Item 15, App. E)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power supply before doing maintenance work on the electrical system.	
Inspection	a. Inspect all installed wiring for cracked or frayed insulation. Pay particular attention to wires passing through holes in the frame or routed around sharp edges. b. Repair or replace bad wiring. c. Inspect electrical connectors and fittings for damage. d. Replace damaged connectors or fittings.	

4-26. JUNCTION BOX WIRING HARNESS – Continued

LOCATION/ITEM	ACTION	REMARKS
Removal	a. Tag all wire leads prior to removal. b. Remove eight screws (1) eight nuts (2) and eight flat washers (3) to release connector (4) from housing. c. Disconnect all connector plugs and terminals. d. Carefully remove harness (5) from unit.	Use Wiring Diagram. (Appendix F)



4-26. JUNCTION BOX WIRING HARNESS - Continued

LOCATION/ITEM	ACTION	REMARKS
Test	a. Test for continuity on wiring harness. b. Touch the test probes of a continuity tester or multimeter, set on low-resistance range to ends of wire and/or corresponding pin of connector. c. If continuity is not indicated, repair or replace wire or damaged connector.	
Repair	a. Remove the insulation to expose 1/2 inch/1.27 centimeters of bare wire on each side of break or damaged insulation. b. Insert the ends into a splice-connector; splice and crimp the connector to make firm electrical contact. c. Alternatively, heat-shrink tubing may be slipped over one end of the wire before splicing, then heated after the splice is made and soldered, so as to cover the spliced area. d. Be sure that no bare wire is exposed after the splice is complete. e. Replace broken terminal lugs with exact duplicates. f. To replace electrical plugs or connectors, tag and unsolder wires from the solder-wells of the inserts. g. Insert bare ends if the wires in corresponding holes of new insert, and solder in place. h. Check continuity terminal-to-terminal.	

4-26. JUNCTION BOX WIRING HARNESS - Continued

LOCATION/ITEM	ACTION	REMARKS
Installation		
	a. Transfer tags to new harness.	
	b. Install connector (4) using eight screws (1), eight nuts (2) and eight flat washers (3).	
	c. Connect all connector plugs and terminals and remove tags.	Use Wiring Diagram, (Appendix F)
	d. Install junction box.	See paragraph 4-25.
	e. Install control module.	See paragraph 4-24.
	f. Install Evaporator Inlet Louver.	See paragraph 4-18.
	g. Install top covers.	See paragraph 4-17.

4-27. COMPRESSOR START RELAY - INSPECT/TEST/REPLACE

This task covers:

a. Removal
b. Test
c. Installation

INITIAL SETUP

Equipment Condition

Para	Condition Description
4-17	Rear and Center Top cover removed.

Test Equipment

Multimeter

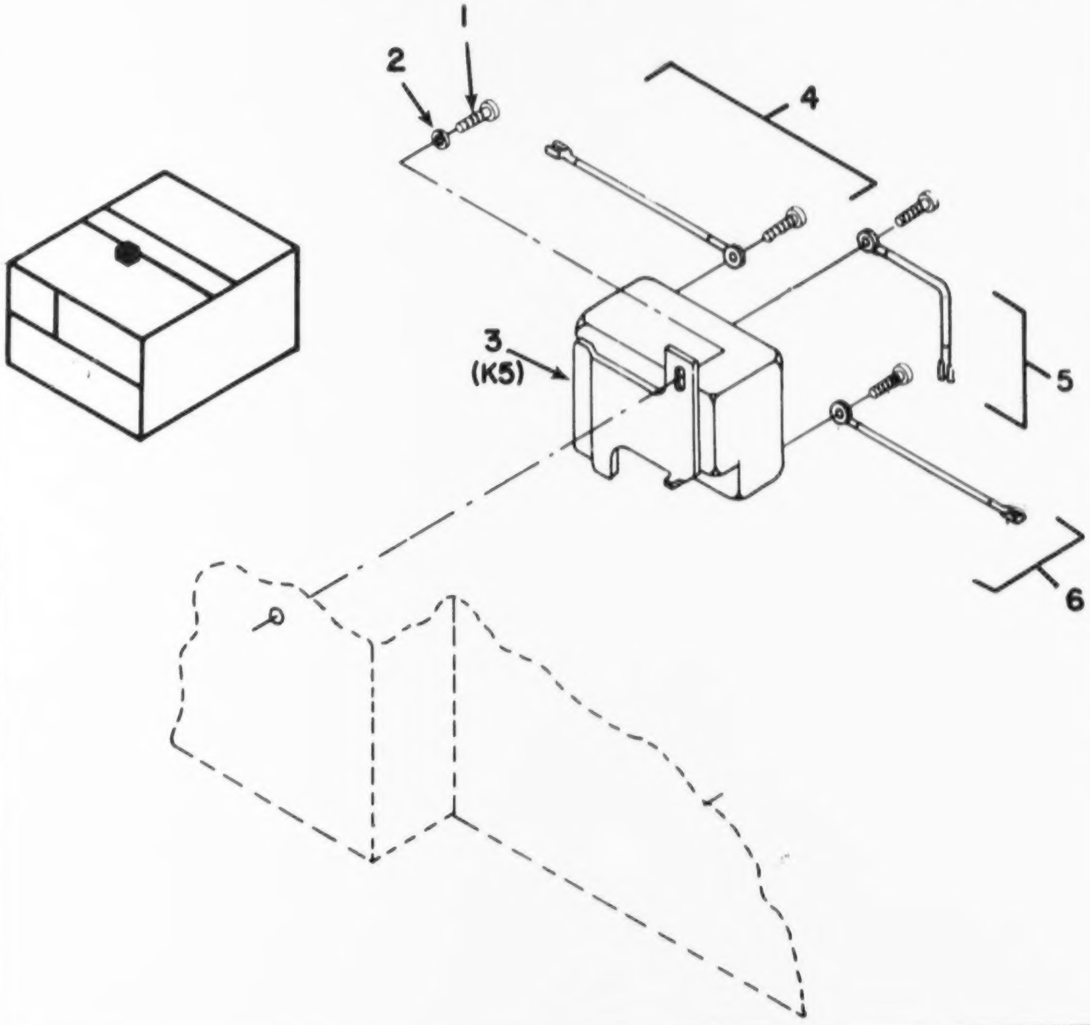
Materials/Parts

Methyl-Ethyl Ketone (MEK) (Item 23, App. E)
Clean Rags (Item 9, App. E)
Silicone Adhesive Sealant RTV (Item 1, App. E)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power source before doing maintenance work on the electrical system.	
TOP REAR		
Removal	a. Remove screw (1) and lockwasher (2) from mounting tab and remove compressor start relay (K5) (3) .	
	WARNING Methyl-Ethyl Ketone (MEK) is flammable and its vapors are explosive. Prolonged or repeated inhalation of fumes or contact with the skin can be toxic. Use in a well ventilated area, wear gloves and keep away from sparks or flame.	

4-27. COMPRESSOR START RELAY - Continued

LOCATION/ITEM	ACTION	REMARKS
TOP REAR - Continued Removal- Continued	b. Using methyl-ethyl ketone (MEK) (Item 23, App. E) and rag (Item 9, App. E) remove silicone adhesive sealant (RTV) from relay. c. Tag and disconnect leads (4), (5), and (6) from the compressor start relay (K5) (3).	



4-27. COMPRESSOR START RELAY - Continued

LOCATION/ITEM	ACTION	REMARKS
Test	a. Inspect for cracks, bent or missing mounting tab, bent or missing terminals, dents or other obvious defects. Replace if damaged/defective.	
	b. Check terminals 1-5, 2-5, and 1-2 for continuity. If continuity does exist, relay is good and may be installed. If continuity does not exist, or if there is a shortcircuit, replace compressor start relay.	See Figures F-1 and F-2.
Installation	a. Using tags as a guide, connect electrical leads (4), (5), and (6) to the compressor start relay (K5) (3) and remove tags.	
	WARNING Silicone Adhesive Sealant RTV, Type I, MIL-A-46106, releases acetic acid during application and curing. Use in well ventilated area to stay below 10 ppm acetic acid. Avoid prolonged skin contact, prolonged inhalation of vapors, and eye contact.	
	b. Coat the terminals and electric leads (1) with 1/8 inch of silicoat adhesive sealant RTV (Item 1, App. E).	
	c. Install the compressor start relay (K5) (3) using screw (1) and lockwasher (2) through mounting tab.	
	d. Install rear and center top covers.	See para 4-17.

4-28. UNIT WIRING HARNESS - INSPECT/TEST/REPAIR/REPLACE

This task covers:

a. Inspection
b. Removal
c. Test
d. Repair
e. Installation

INITIAL SETUP

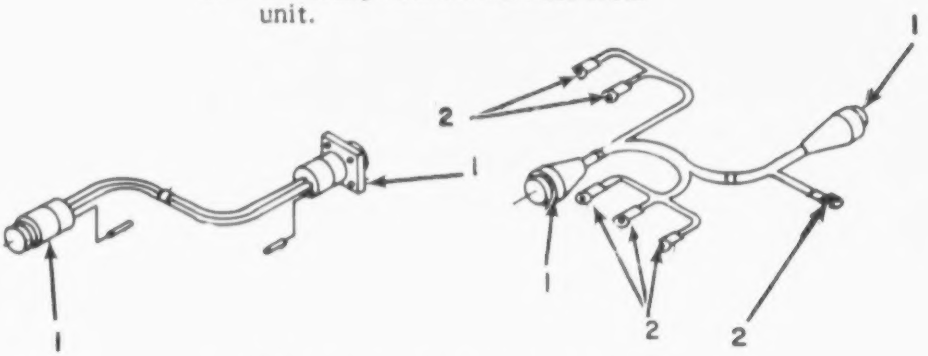
Equipment Condition Para	Condition Description
4-17	Rear Top Cover removed.

Test Equipment
- Multimeter
- Continuity Tester

Materials/Parts
- Solder (Item 2, App. E)
- Flux (Item 15, App. E)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power supply before doing maintenance work on the electrical system.	
Inspection	a. Inspect all installed wiring for cracked or frayed insulation. Pay particular attention to wires passing through holes in the frame or routed around sharp edges. b. Repair or replace bad wiring. c. Inspect electrical connectors (1) and terminal lugs (2) for damage. d. Replace damaged connectors (1) or terminal lugs (2).	

4-28. UNIT WIRING HARNESS - Continued

LOCATION/ITEM	ACTION	REMARKS
Removal	a. Tag all wire leads prior to removal. b. Disconnect all connector plugs (1) and terminal lugs (2). c. Carefully remove harness from unit.  	Use Wiring Diagram. (Appendix F)
Test	a. Test for continuity on wiring harnesses. b. Touch the test probes of a continuity tester or multimeter, set on low-resistance range, to ends of wire and/or corresponding pin of connector. c. If continuity is not indicated, repair or replace wire or damaged connector.	
Repair	a. Remove the insulation to expose 1/2 inch/1.27 centimeters of bare wire on each side of break or damaged insulation. b. Insert the ends into a splice-connector; splice and crimp the connector to make firm electrical contact. c. Alternatively, heat-shrink tubing may be slipped over one end of the wire before splicing, then heated after the splice is made and soldered, so as to cover the spliced area.	

4-28. UNIT WIRING HARNESS - Continued

LOCATION/ITEM	ACTION	REMARKS
Repair - (Continued)	d. Be sure that no bare wire is exposed after the splice is complete.	
	e. Replace broken terminal lugs with exact duplicates.	
	f. To replace electrical plugs or connectors, tag and unsolder wires from the solderwells of the inserts.	
	g. Insert bare ends of the wires in corresponding holes of new insert, and solder in place.	
	h. Check continuity terminal-to-terminal.	
Installation	a. Transfer tags from old cable to new cable.	
	b. Connect all connectors (1) and terminal lugs (2) and and remove tags.	Use Wiring Diagram, (Appendix F).
	c. Install rear top cover	Para. 4-17

4-29. CAPACITORS - INSPECT/TEST/REPLACE

This task covers:

- a. Removal
- b. Test
- c. Installation

INITIAL SETUP

Equipment Condition

Para	Condition Description
4-17	Rear Top Cover removed.

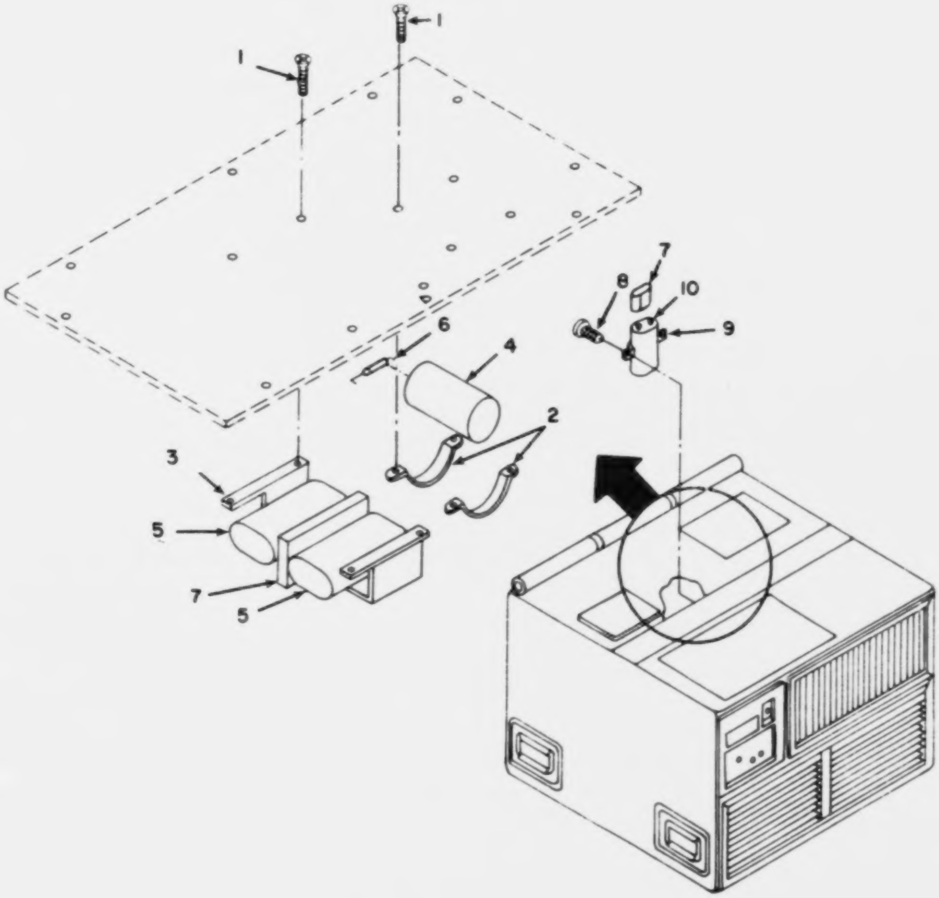
Test Equipment
Multimeter,or
Ohmmeter

Special Tools
Offset Screwdriver

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power source before doing maintenance work on electrical system.	
	WARNING Ground all capacitors before touching	
Removal 1. Fan Motor and Compressor Start Capacitors	a. Loosen eight screws (1) securing straps (2 and 3) holding capacitors to underside of rear top cover, do not remove straps.	Removal is only necessary when capacitors are to be replaced.
	b. Remove capacitors (4 and 5) by sliding out from under straps (2 and 3).	
	c. Desolder resistor (6) from compressor start capacitor (4) terminals.	

4-29. CAPACITORS – Continued

LOCATION/ITEM	ACTION	REMARKS
Removal– Continued		
2. Compressor Run Capacitor	a. Slide rubber boot (7) away from leads.	
	b. Using an instrument with an insulated handle, discharge capacitor.	
	c. Tag and disconnect leads. Loosen strap screw (8) using offset screwdriver.	
	d. Remove compressor run capacitor (10) from strap (9).	



4-29. CAPACITORS - Continued

LOCATION/ITEM		ACTION	REMARKS
Test 3. Fan Motor Capacitors (6) and Compressor Start Capacitor (3)	a.	Check for internal condition by placing the test leads of an ohmmeter on the terminals of the capacitor.	
	b.	Ohmmeter needle should move rapidly toward top of the scale; then slowly return toward zero if the capacitor is good.	
	c.	If needle moves to top of scale and remains there, the capacitor is internally short-circuited; if the needle does not move, the capacitor contains an open circuit.	
	d.	Replace capacitors with short/open circuits.	
	e.	If the capacitors have a metal case, check also for shorts to case.	
	f.	There will be no deflection of the ohmmeter needle if the capacitor is good. If the needle does deflect, replace the capacitor.	
	g.	Check compressor start capacitor resistor with ohmmeter. Nominal value 15 kiloohms plus/minus 20% (Range 12,000-18,000 ohms). If defective, discard and replace. Resolder serviceable start capacitor terminals.	

4-29. CAPACITORS - Continued

LOCATION/ITEM		ACTION	REMARKS
Test-Continued			
4. Compressor Run Capacitor (10)	a.	Test capacitor (10) for internal leakage and short or open circuits by using an ohmmeter set at maximum resistance.	
	b.	Check for internal condition by placing the test leads of an ohmmeter on the terminals of the capacitor. Place positive (+) lead to positive terminal and negative (–) lead to negative terminal. The ohmmeter needle should move rapidly toward top of scale; then slowly return toward zero if capacitor is good. If needle moves to top of scale and remains there, the capacitor is internally short circuited; if the needle does not move, the capacitor contains an open circuit. Replace capacitor indicating short or open circuits.	
	c.	If the capacitor has a metal case, check for short circuits to case by placing the positive (+) lead of the ohmmeter on the positive terminals of the capacitor and the negative (–) lead on the case. There will be no deflection of the ohmeter needle if the capacitor is good. If the needle does deflect, replace the capacitor.	
Installation			
5. Compressor Run Capacitor(10)	a.	Install good compressor run capacitor (10) into strap (9).	See Wiring Diagram, (Appendix F).
	b.	Tighten screws (8) using offset screwdriver.	
	c.	Connect the leads and remove tags.	
	d.	Slide rubber boot (7) over leads.	
	e.	Install the top rear cover.	

4-29. CAPACITORS - Continued

LOCATION/ITEM		ACTION	REMARKS
Installation 6. Fan Motor Capacitors (6) and Compressor Start Capacitor (3)	a.	Solder resistor (6) to compressor start capacitor (4) terminals.	
	b.	Install capacitors (4 and 5) in securing straps (2 & 3).	Perform steps b and c only if capacitors were replaced.
	c.	Tighten eight screws (1) attaching capacitors (4 and 5) and securing straps (2 and 3) to underside of rear top cover.	
	d.	Reconnect wiring	
	e.	Install rear top cover.	See para. 4-17.

4-30. RECTIFIER - INSPECT/TEST/REPLACE

This task covers:

- a. Removal
- b. Inspection
- c. Test
- d. Installation

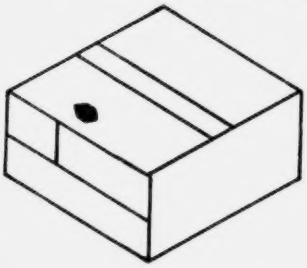
INITIAL SETUP

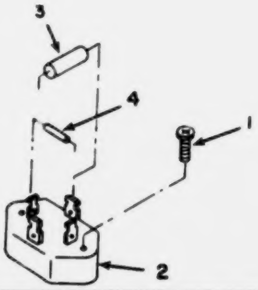
Equipment Condition Para	Condition Description
4-17	Front Top Cover removed.
4-18	Evaporator Inlet Louver removed.
4-24	Control Module removed.
4-25	Junction Box partially removed.

Test Equipment
Multimeter
Variable Voltage Power Source (AC/DC)

Materials/Parts
Solder (Item 2, App. E)
Flux (Item 15, App. E)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power source before doing work on electrical system.	
Removal	a. Tag and disconnect leads. b. Remove two screws (1). c. Remove rectifier (2) from unit. d. Remove shrink sleeving from capacitor C6 (3). e. Desolder capacitors (3 and 4).	See Figure F-1.





4-30. RECTIFIER - Continued

LOCATION/ITEM	ACTION	REMARKS
Inspection	a. Inspect rectifier (4) for external damage.	
	b. Inspect capacitors (2 and 3) for external damage.	
	c. Replace if damaged.	
Test 1. Rectifier	a. Apply 24-28 VAC to input terminals 1 & 3	See Figure F-2.
	b. Check for 24-28 VDC across output terminals (marked pos and neg) 2 & 4.	
	c. Replace if fails test.	
2. Capacitor	a. Check for internal condition by placing the test leads of an ohmmeter on the terminals of the capacitor.	
	b. Ohmmeter needle should move rapidly toward top of the scale; then slowly return toward zero if the capacitor is good.	
	c. If needle moves to top of scale and remains there, the capacitor is internally short-circuited; if the needle does not move, the capacitor contains an open circuit.	
	d. Replace capacitors with short/open circuits.	
Installation	a. Install shrink sleeving on capacitor C6 (3).	
	b. Solder capacitors (3 and 4) to rectifier (2).	See Figures F-1 and F-2.
	c. Install rectifier (2) using two screws (1).	
	d. Connect leads and remove tags on wires.	
	e. Install junction box.	See para. 4-25.
	f. Install control module.	See para. 4-24.
	g. Install evaporator inlet louver.	See para. 4-18.
	h. Install front top cover.	See para. 4-17.
	i. Reconnect power.	

4-31. TRANSFORMER - INSPECT/TEST/REPLACE

This task covers:

a. Removal	d. Installation
b. Test	
c. Replacement	

INITIAL SETUP

Equipment Condition

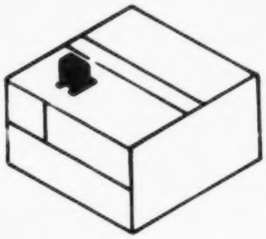
Para	Condition Description
4-18	Evaporator Inlet Louver removed.
4-17	Front top cover removed.
4-24	Control Module removed.
4-25	Junction Box partially removed.

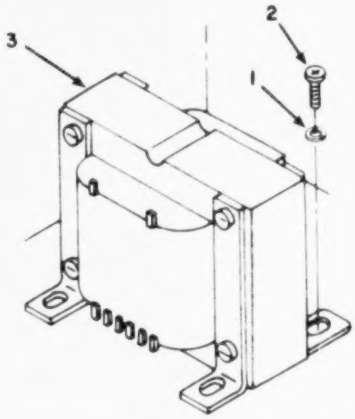
Test Equipment
Multimeter
Variable Voltage Power Source (AC/DC)

Materials/Parts
Solder (Item 2, App. E)
Flux (Item 15, App. E)

LOCATION/ITEM	ACTION	REMARKS
Removal	**WARNING** Disconnect air conditioner power source before doing work on electrical system.	
	a. Remove screws (2) and lockwashers (1).	
	b. Remove shrink sleeving from two input and six output terminals.	
	c. Tag and desolder all wires connected to input and output terminals, except for wires between terminals 3 and 6 and 4 and 2.	See Fig. F-2 for all test steps.
	d. Lift transformer (3) out of unit.	

4-31. TRANSFORMER - Continued





LOCATION/ITEM	ACTION	REMARKS
Test	a. Check for continuity across primary terminals 1 & 6. b. Check for continuity across secondary terminals 7 & 8. c. Check for discontinuity between primary and secondary coils. d. If transformer fails continuity/ discontinuity test, replace. e. Connect 115 VAC power source to primary terminals. f. Connect multimeter to secondary terminals. g. Check for reading of 27 to 33 VAC. h. If transformer fails test, replace.	See Figure F-2 for all test steps.

4-31. TRANSFORMER - Continued

LOCATION/ITEM	ACTION	REMARKS
Installation	a. Slide new shrink sleeving onto and up wire.	
	b. Solder leads on terminals and remove tags.	
	c. Slide shrink sleeving down wire and over solder connection.	
	d. Heat shrink sleeving onto solder connection.	
	e. Secure transformer (3) to housing using screws (2) and lockwasher (1).	
	f. Install junction box.	See para. 4-25.
	g. Install control module.	See para. 4-24.
	h. Install evaporator inlet louver.	See para. 4-18.
	i. Install front top cover.	See para. 4-17.

4-32. EVAPORATOR FAN AND HOUSING - REPLACE

This task covers:

a.	Removal	c.	Assembly
b.	Disassembly	d.	Installation

INITIAL SETUP

Equipment Condition

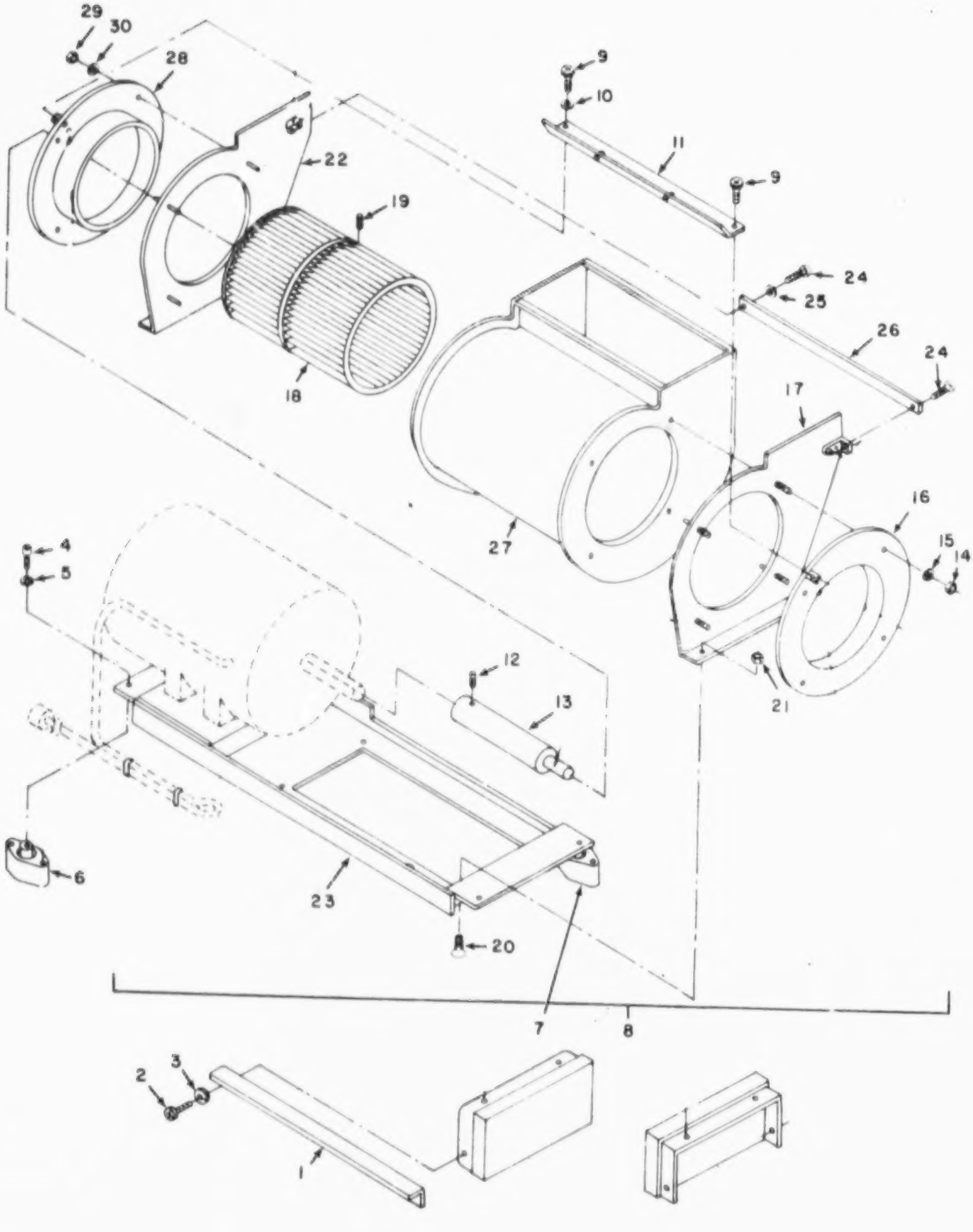
Para	Condition Description
4-18	Evaporator Inlet Louver removed.
4-23	Evaporator drain tubing removed.
4-24	Control Module removed.

Test Equipment
Ohmmeter
Continuity Tester or Multimeter

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power source before doing maintenance work on the electrical system.	
FRONT OF HOUSING		
Removal		
1. Evaporator Fan Assembly	a. Unplug the electrical connector from the motor. b. Remove the bracket (1) by removing two screws (2) and two lockwashers (3). c. Loosen clamps holding temperature selector switch sensing bulb, move bulb to clear housing. d. Remove four screws (4) and four lockwashers (5) securing the fan and motor base to the resilient mounts (6 and 7). e. Lift out fan and motor assembly (8).	

4-32. EVAPORATOR FAN AND HOUSING - Continued

LOCATION/ITEM	ACTION	REMARKS
Disassembly 2. Fan & Housing	a. Remove two screws (9) and flat washer (10) on strap (11). Remove strap (11). b. Loosen the setscrew (12) on motor shaft extension (13). c. Remove four nuts (14) and four flat washers (15) securing inlet ring (16) to flange (17). d. Remove inlet ring (16). e. Withdraw impeller (18) and shaft extension (13) through opening of flange (17). f. Loosen setscrew (19) of impeller (18) that secures impeller to shaft extension (13). g. Remove shaft extension (13) from impeller (18) h. Remove four screws (20) and four nuts (21) securing flanges (17 and 22) to base (23). i. Remove two screws (24) and flat washer (25) on strap (26). Remove strap (26). j. Remove flange (17). k. Remove housing (27). l. Remove flange (22) with inlet ring (28). m. Remove four nuts (29) and four flat washers (30) securing inlet ring (28) to flange (22), and remove inlet ring (28).	



4-32. EVAPORATOR FAN AND HOUSING - Continued

LOCATION/ITEM	ACTION	REMARKS
Inspection	a. Inspect shaft extension (13), fan inlet rings (16 and 28), impeller (18), flanges (17 and 22), straps (11 and 26) and housing (27) for visible out-of-round conditions, dents, burrs and nicks. b. Replace defective items. c. Check impeller (18) for damaged or bent vanes. Straighten or replace impeller (18).	
Assembly 3. Evaporator Fan Assembly	**WARNING** Acetone and Methyl-Ethyl Ketone are flammable and either vapors are explosive. Prolonged or repeated inhalation of fumes or contact with the skin can be toxic. Use in a well ventilated area, wear gloves and keep away from sparks or flame. a. Clean off old sealant from inlet rings (16 and 28) and flanges (17 and 22) using methyl-ethyl ketone and clean rag. b. Clean off old sealant from sides of housing (27) using methyl-ethyl ketone (MEK) Item 23, App. E). c. Install inlet rings (16 and 28) to flanges (17 and 22) respectively using eight nuts (14 and 29) and eight flat washers (15 and 30).	

4-32. EVAPORATOR FAN AND HOUSING – Continued

LOCATION/ITEM	ACTION	REMARKS
Assembly–Continued	**WARNING** Industrial sealant (Item 28, App. E) is extremely flammable. The vapors given off from this product can easily be ignited. Contains methylethyl ketone (MEK), methyl isobutyl ketone (MIBK) and asbestos (bound). Keep product and its vapors away from heat, sparks and open flames. Use only in a well ventilated area with enough air movement to remove vapor and prevent vapor build up. Avoid prolonged breathing of vapor. Avoid eye contact. Avoid prolonged or repeated skin contact. d. Seal the outer edge of the inlet rings (16 and 28) to flanges (17 and 22) using industrial sealant Item 28, App. E) and acid swab brush (Item 29, App. E). e. Install inlet ring (28) and flange (22) to base (23) using two screws (20) and two nuts (21). f. Insert motor shaft extension (13) into impeller (18). g. Tighten impeller setscrew (19) on motor shaft extension (13). h. Install motor shaft extension (13) and impeller (18) onto motor shaft. i. Install housing (27) to connect with flange (22) and inlet ring (28). j. Install inlet ring (16) and flange (17) onto housing (27) and base (23) using two screws (20) and two nuts (21).	

4-32. EVAPORATOR FAN AND HOUSING - Continued

LOCATION/ITEM	ACTION	REMARKS
Assembly–Continued		
	k. Install strap (11) to inlet rings (16 and 28) with two screws (9) and flat washer (10). Position strap (11) parallel to base (23) before final tightening of two screws (9) and flat washer (10).	
	l. Install strap (26) to flanges (17 and 22) using two screws (24) and flat washer (25).	
	m. Position impeller (18) inside housing with equal space from each inlet ring (16 and 28).	
	n. Tighten setscrew (12) in motor shaft extension (13).	
	WARNING Industrial sealant (Item 28, App, E) is extremely flammable. Keep away from sparks, heat, and open flames. Use on well ventilated area. Avoid prolonged breathing of vapor, prolonged skin contact and eye contact.	
	o. Seal outer edge of flanges (17 and 22) to sides of housing (27) using industrial sealant (Item 28, App. E) and acid swab brush (Item 29, App. E).	

4-32. EVAPORATOR FAN AND HOUSING - Continued

LOCATION/ITEM	ACTION	REMARKS
Installation	a. Place the fan and motor assembly on resilient mounts (6 and 7) and install four screws (4) and four lockwashers (5).	
	b. Install bracket (1) using two screws (2) and two lockwashers (3).	
	c. Place the temperature selector switch sensing bulb in clamps and tighten screws.	
	d. Install evaporator drain tubing.	See paragraph 4-21.
	e. Plug in the motor electrical connector.	See Figure 4-23.
	f. Install the evaporator inlet louver.	See paragraph 4-14.
	g. Install control module.	See paragraph 4-24.

4-33. EVAPORATOR MOTOR - INSPECT/TEST/REPLACE

This task covers:

a. Inspect	c. Removal
b. Test	d. Installation

INITIAL SETUP

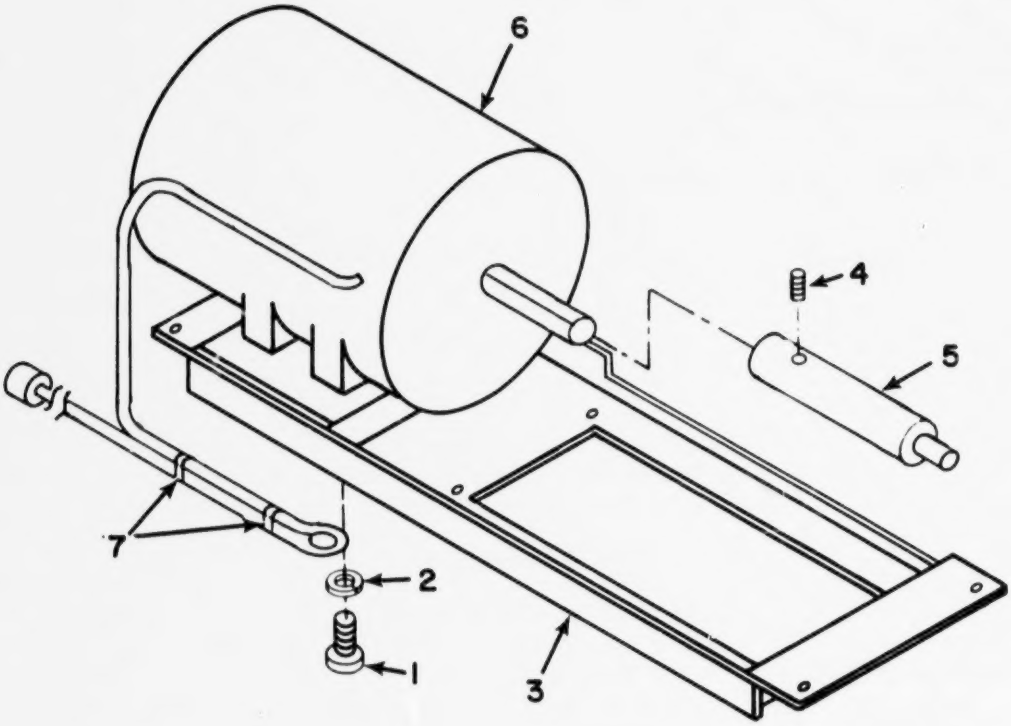
Equipment Condition Para	Condition Description
4-32	Evaporator Fan Assembly removed.
4-18	Inlet Louver removed.
4-23	Evaporator Drain Tubing removed.

Test Equipment
Ohmmeter or,
Continuity Tester

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power source before doing maintenance work on the electrical system.	
Inspect	Inspect plug for bent pin, loose wires, etc.	
Testing	a. Turn the motor shaft by hand and listen for clicking sounds that indicate bad bearings. b. If the shaft cannot be rotated, the bearings may have seized. c. Test the thrust bearings by attempting to push and pull the motor shaft axially. d. If end play is excessive (i.e. can be felt manually in push-pull), the thrust bearings or shims are worn beyond limits and should be replaced. e. If fails test, notify direct support maintenance personnel.	

4-33. EVAPORATOR MOTOR - Continued

LOCATION/ITEM	ACTION	REMARKS
	f. Use an ohmmeter or continuity tester to check continuity between pins of the electrical connector (P3).	See Appendix F, Wiring Diagram.
	g. The motor is capable of operating at two speeds; therefore, there are two sets of field coils.	
	h. Check to be sure the continuity exists between connector pins A and B and E and D which indicates that open circuits do not exist.	
	i. Then check from pin G to pins A,B,E and D. No continuity should exist, which indicates that there is no internal short circuit. Replace the motor if either short or open circuits exist.	
Removal	a. Remove four cap screws (1) and four lockwashers (2) from underside of base (3).	
	b. Loosen the setscrew (4) on shaft extension (5) and remove motor (6).	
Installation	a. Set the motor (6) on base (3) with the motor shaft in the shaft extension (5).	
	b. Install four cap screws (1) and four lockwashers (2) through the underside of the base (3) to secure the motor.	
	c. Tighten setscrew (4) of shaft extension (5).	
	d. Install evaporator fan assembly.	See paragraph 4-32.
	e. Install evaporator drain tubing.	See paragraph 4-23.
	f. Connect the motor electrical connector.	
	g. Install the evaporator inlet louver.	See paragraph 4-18.



4-34. HEATER THERMOSTAT - INSPECT/TEST/REPLACE

This task covers:

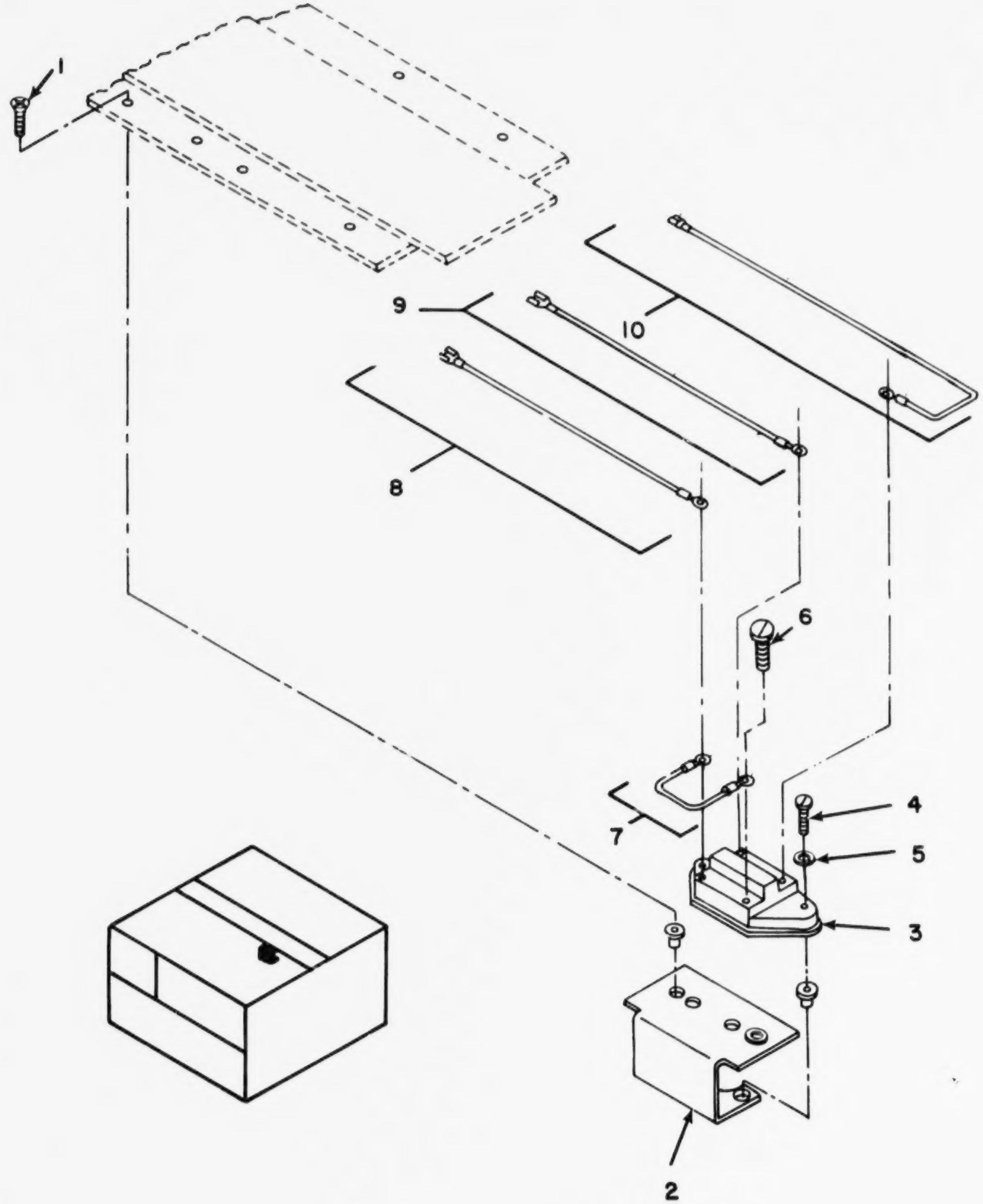
a.	Inspect	c.	Test
b.	Removal	d.	Install

Equipment Condition Para	Condition Description
4-17	Front and Center covers removed.

Test Equipment
- Multimeter
- Thermometer (32°F to 212°F)-(0°C to 100°C)

Materials/Parts
- 150-watt lamp bulb or heat gun

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power supply before doing maintenance work on the electrical system.	
Inspect	Inspect for wiring damage.	
Removal	a. Take out two screws (1) and remove bracket (2) and thermostat (3) from center cover. b. Take out two screws (4) and two lockwashers (5) and remove thermostat from bracket (2). c. Tag leads and remove four screws (6) to disconnect leads (7,8,9, and 10).	



4-34. HEATER THERMOSTAT - Continued

LOCATION/ITEM		ACTION	REMARKS
Test	a.	Using a multimeter on the lowest possible setting test for continuity between contacts 1 and 2 and between contacts 3 and 4. Contacts should open on temperature rise at 145-155 degrees F (63-68 degrees C) and should close on temperature drop at 100-120 degrees F (38-49 degrees C). Use 150-watt lamp bulb or heat gun as heat source for testing.	See Wiring Diagram F-2 in Appendix F. Use thermometer to determine temperature of sensor surface.
	b.	Replace if defective.	
Installation	a.	Connect leads (7,8,9, and 10) to thermostat (3) with four screws (6) and remove tags.	
	b.	Attach the thermostat (3) to bracket (2) with two screws (4) and two lockwashers (5).	
	c.	Secure the bracket (2) to the center cover with two screws (1).	
	d.	Install front and center covers.	See paragraph 4-17.

4-35. HEATER ELEMENTS - INSPECT/TEST/REPLACE

This task covers:

a. Inspect
b. Test
c. Remove
d. Install

INITIAL SETUP

Equipment Condition Para	Condition Description
4-17	Top covers removed.
4-25	Junction box pulled half way out of unit.
4-24	Control Module Removed

Test Equipment
Multimeter

Materials/Parts
Toluoiene (Item 27, App. E)
Adhesive (Item 18, App. E)
Insulation (Item 25, App. E)

LOCATION/ITEM	ACTION	REMARKS

WARNING

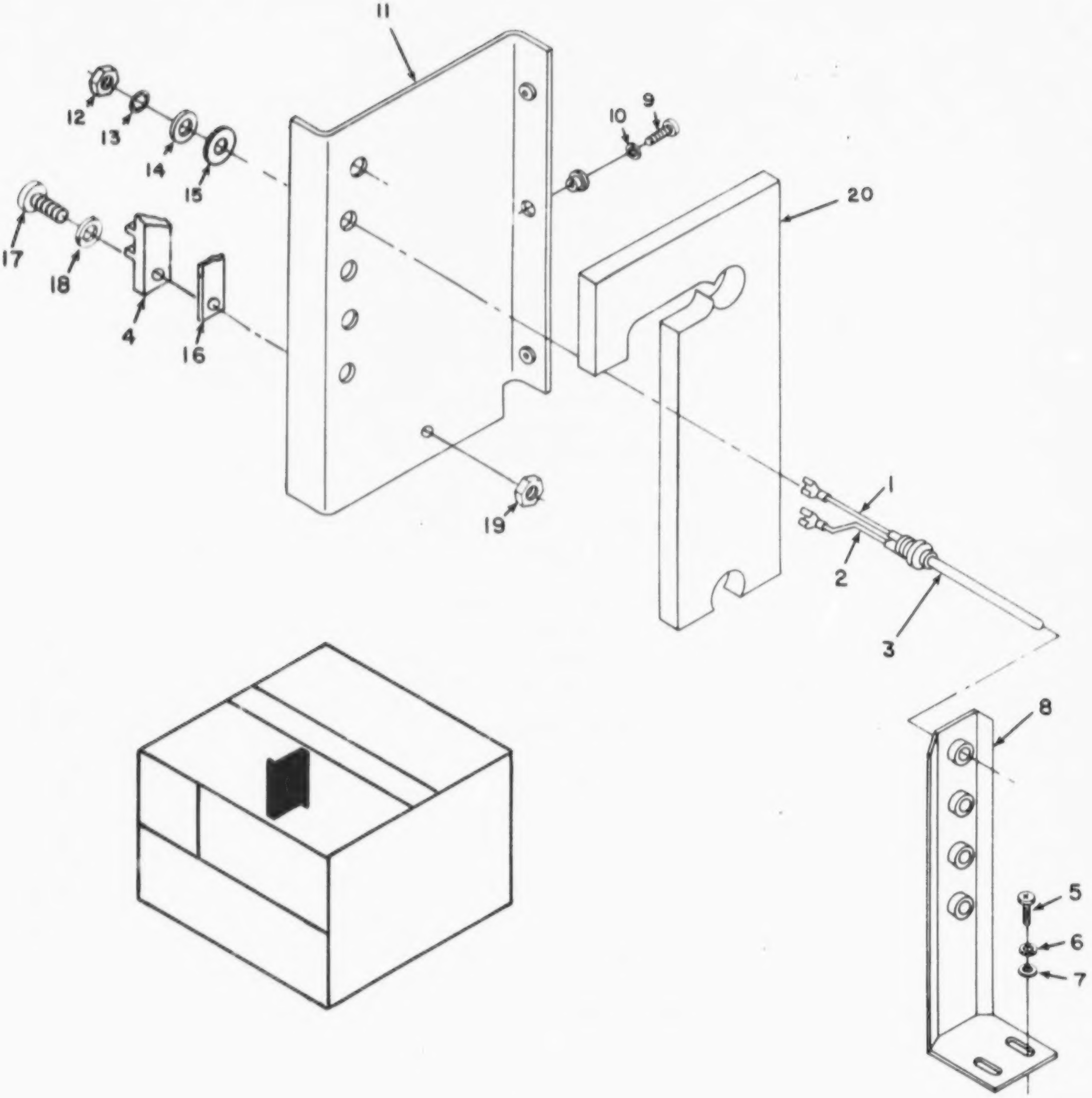
Allow heating elements to cool for 15 minutes before touching.

WARNING

Disconnect air conditioner power supply before doing maintenance work on the electrical system.

4-35. HEATER ELEMENTS - Continued

LOCATION/ITEM	ACTION	REMARKS
Inspection		
1. Heater Elements and Electrical Wiring	a. Inspect for damage to elements or leads. b. Check heater element for continuity. c. Replace damaged leads and bad elements.	
2. Heater Support Bracket	a. Inspect for warping or cracking. b. Replace as necessary.	
3. Heater Support Bracket	a. Inspect for warping or cracking. b. Replace as necessary.	
4. Heater Mounting Bracket Insulation	a. Inspect for damaged or missing insulation. b. Replace as necessary.	
5. Terminal Board (TB2)	a. Inspect TB2 for corrosion or damage. b. Replace as necessary.	
Test	Test elements by checking for continuity between the two electrical leads (1 and 2) of each heater element (3) if continuity does not exist, replace the element.	
Removal	a. Tag and disconnect leads (1 and 2) from terminal board TB2 (4). b. Remove two screws (5), two lockwashers (6), and two flat washers (7) securing heater support bracket (8) to housing. c. Remove heater support bracket (8) from ends of heating elements (3).	



4-35. HEATER ELEMENTS – Continued

LOCATION/ITEM	ACTION	REMARKS
Removal – (Continued)	d. Remove three screws (9) and three lockwashers (10) securing heater mounting bracket (11) to housing.	
	e. For each heater element (3), Remove nut (12), lockwasher (13), flat washer (14), and insulator (15) securing heater element (3) to heater mounting bracket (11).	
	f. Slide each heating element (3) from heater mounting bracket (11).	Do not remove tags from heater element wire.
	g. Remove heater mounting bracket (11) with terminal board (TB2) (4) and marker strip (16) from unit.	
	h. Remove two screws (17), two lockwashers (18) and two nuts (19) securing TB2 to bracket (11).	
	i. Remove terminal board TB2 from bracket (11).	
	j. Remove insulation (20) from bracket (11) using a scraper.	

WARNING

Toluolene is flammable and its vapors can be explosive. Repeated or prolonged skin contact or inhalation of vapor can be toxic. Use in well ventilated area and keep away from sparks or flame. Use goggles, gloves, and apron when appropriate.

4-35. HEATER ELEMENTS - Continued

LOCATION/ITEM	ACTION	REMARKS
Installation		
	a. Clean heater mounting bracket (11) with toluolene (Item 28, App. E) and lint free cloth (Item 9, App. E).	
	b. Measure and cut piece of unicellular plastic foam insulation (Item 25, App. E)	
	c. Apply adhesive (Item 18, App E) to foam insulation heater mounting bracket (11) using acid swab brush (item 27, App. E) and allow to become tacky.	
	d. Press foam insulation (20) firmly into place.	
	e. Replace terminal board TB2 if terminals are missing or unserviceable.	
	f. Replace marker strip (16) if cannot be easily read, if cracked, or missing.	
	g. Insert heater elements (3) and insulator (15) into heater mounting bracket (11).	
	h. Secure each heater element (3) to heater mounting bracket (11) using flat washer (14), lockwasher (13) and nut (12).	
	i. Install heater mounting bracket (11) in unit using three screws (9) and three lockwashers (10).	
	j. Slide heater support bracket (8) over ends of heating elements (3).	
	k. Secure heater support bracket (8) to housing using two lockwashers (6), two flat washers (7), and two screws (5).	
	l. Connect leads (1 and 2) to terminal board TB2 (4) and remove tags.	
	m. Install junction box.	See para. 4-25.
	n. Install top covers.	See para. 4-24.
	o. Control module installed.	

4-36. CONDENSER FAN, HOUSING AND MOTOR - INSPECT/TEST/REPLACE

This task covers:

a.	Removal	d.	Test
b.	Disassembly	e.	Assembly
c.	Inspection	f.	Installation

INITIAL SETUP

Equipment Condition Para	Condition Description
4-17	Rear and Center Top Covers removed.
4-21	Condenser Louver removed.
4-27	Compressor Start Relay removed.

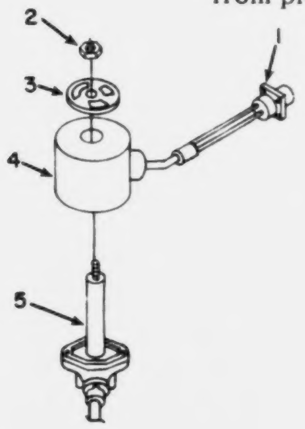
LOCATION/ITEM	ACTION	REMARKS

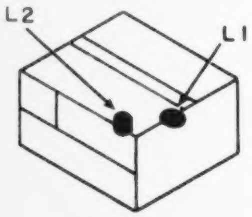
WARNING

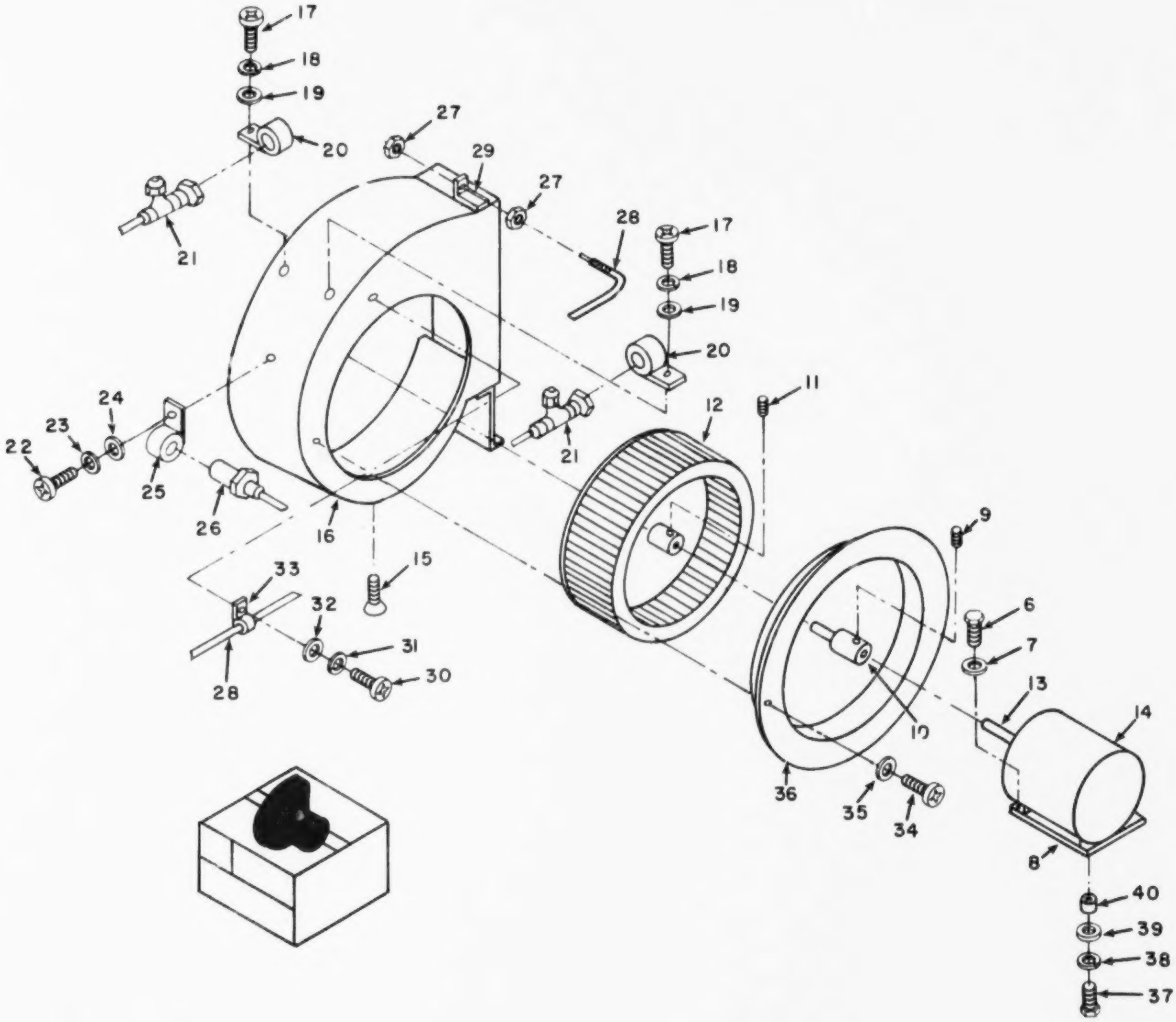
Disconnect air conditioner power supply before doing maintenance work on the electrical system.

TOP OF HOUSING

Removal	a. Disconnect electrical connector (1) for solenoid coil L2 from bulkhead.	
	b. Remove plunger nut (2) and nameplate (3), and remove solenoid coil (4) from plunger (5).	







4-36. CONDENSER FAN, HOUSING AND MOTOR - Continued

LOCATION/ITEM	ACTION	REMARKS
Removal - (Continued	c. Tag and disconnect the motor connectors.	
	d. Remove four screws (6), and four flat washers (7) securing motor mounting plate (8) to housing.	
	e. Remove wire ties as required.	
	f. Loosen two setscrews (9) on the shaft extension (10) and the setscrew (11) on the impeller (12).	
	g. Separate the shaft extension (10) from the impeller (12) by sliding the shaft extension (10) snug onto the motor shaft (13).	
	h. Remove the shaft extension (10) from the motor shaft (13) and set aside.	
	i. Lift out the motor (14) and mounting plate (8) and set aside.	
	CAUTION Take care to avoid damaging the condenser coil while removing motor and mounting plate from unit.	
	j. Remove five screws (15) to loosen scroll housing (16).	
	k. Remove two screws (17) two lockwashers (18) and two flatwashers (19) from clamps (20) securing service valves (21) to scroll housing.	
	l. Remove screw (22) lockwasher (23) and flat washer (24) from clamp (25) securing high pressure relief valve (26) to scroll housing (16).	

4-36. CONDENSER FAN, HOUSING AND MOTOR - Continued

LOCATION/ITEM	ACTION	REMARKS
Removal- (Continued)	m. Remove nut (27) from louver control cable (28) and disconnect from bracket (29).	
	n. Remove screw (30), flat washer (31) and lockwasher (32) from clamp (33), securing louver control cable (28) to scroll housing (16).	
	CAUTION Handle tubing at service valves and pressure relief valve with special care to avoid kinking or creating leaks at brazed joints.	
	o Bend tubing back at service valves (21) and at pressure relief valve (26) with extreme care to permit scroll to be rotated.	
	p. Rotate scroll housing (16) so that louver opening is at top.	
	q. Ease base flange of scroll housing (16) up until it extends slightly above the cabinet housing.	
	r. Rotate scroll housing (16) towards the condenser louver opening and lift carefully from housing.	
Disassembly	a. Remove three screws (34) and three flat washers (35) from inlet ring (36) and remove inlet ring (36) from scroll (16).	
	b. Remove impeller (12) gently from scroll (16). (Do not force)	

4-36. CONDENSER FAN, HOUSING AND MOTOR - Continued

LOCATION/ITEM	ACTION	REMARKS
Disassembly-(Continued)	c. Separate motor (14) from mounting plate (8) by removing four screws (37), four lockwashers (38), eight flat washers (39) and four bushings (40).	
Inspection	a. Visually inspect impeller (22), inlet ring (21), shaft extension (4) and scroll (8) for nicks, dents and out of round conditions.	
	b. Straighten bent vanes on impeller (12).	
	c. Replace unserviceable impeller (12).	
	d. Straighten bent inlet ring (36) and scroll (8). Replace if unserviceable.	
	e. Replace damaged shaft extension (10).	
Test	a. Inspect exterior case of motor for cracks, dents, oil, evidence of overheating any other abnormalities.	Replace defective motor.
	b. Turn motor shaft by hand and listen for clicking sounds that indicate bad bearings. Report condition to direct support maintenance personnel.	
	c. If the shaft cannot be rotated, the bearings may have seized.	
	d. Test the thrust bearings by attempting to push and pull the motor shaft axially. Report condition to direct support maintenance personnel.	
	e. If end play is excessive (i.e. can be felt on manual push-pull), the thrust bearings and shims are worn beyond limits and should be replaced.	See paragraph 5-8.

4-36. CONDENSER FAN AND HOUSING AND MOTOR - Continued

LOCATION/ITEM	ACTION	REMARKS
	f. Use an ohmmeter or continuity tester to check continuity between pins of the electrical connector (P5).	See Wiring Diagram (Appendix F)
	g. Check to be sure that continuity exists between connector pins A and B and between E and D. This means that open circuits do not exist.	Replace motor if either open or short circuits exist.
	h. Then check from pin G to pins A,B,E, and D. No continuity should exist, which indicates that there is not an internal short circuit.	
Assembly	a. Secure motor (14) to mounting plate (8) using four screws (37), four lockwashers (38), eight flat washers (39) and four bushings (40).	
	b. Insert impeller (12) into scroll housing (16).	
	c. Install inlet ring (36) onto scroll housing (16) using three screws (34) and three flat washers (35).	
Installation	a. Insert scroll housing (16) back into position in unit.	
	CAUTION Handle tubing at service valves and pressure relief valve with special care to avoid kinking or creating leaks at brazed joints.	
	b. Bend tubing back into position at service valves (21) and at pressure relief valve (26) with extreme care.	

4-36. CONDENSER FAN, HOUSING AND MOTOR - Continued

LOCATION/ITEM	ACTION	REMARKS
Installation- (Continued)	c. Secure louver control cable (28) to scroll housing (16) using screw (30), flat washer (31), lockwasher (32), and clamp (33). d. Insert louver control cable (28) through bracket (29) and secure with nut (27). e. Secure high pressure relief valve (26) to scroll housing (16) using screw (22), lockwasher (23), flat washer (24) and clamp (25). f. Secure service valves (21) to scroll housing (16) using two screws (17), two lockwashers (18), two flat washers (19) and two clamps (20). g. Install five screws (15) to secure scroll housing. **CAUTION** Take care to avoid damaging the condenser coil when installing the motor and mounting plate in unit. h. Place motor (14) and mounting plate (8) into position in the housing. i. Insert shaft extension (10) onto motor shaft (13). j. Align the shaft extension (10) with the impeller (12) and join together. k. Tighten the setscrew (11) on the impeller (12). l. Secure the motor mounting plate (8) to the housing using four screws (6) and four flat washers (7).	

4-36. CONDENSER FAN, HOUSING AND MOTOR - Continued

LOCATION/ITEM	ACTION	REMARKS
Installation - (Continued)		
	m. Center impeller (12) in scroll housing (16) while looking through the louver opening.	
	n. Tighten two setscrews (9) on the shaft extension (10).	
	o. Connect the motor connections and remove tags.	
	p. Install the solenoid coil (4) onto the plunger (5) with nameplate (3) and plunger nut (2).	
	q. Connect the electrical connector (1) for solenoid coil L2 to the bulkhead.	
	r. Install condenser louver.	See para. 4-21.
	s. Install compressor start relay.	See para. 4-27.
	t. Install rear and center top covers.	See para. 4-17.

4-37. EVAPORATOR COIL ASSEMBLY - SERVICE

This task covers:

a. Inspection b. Cleaning

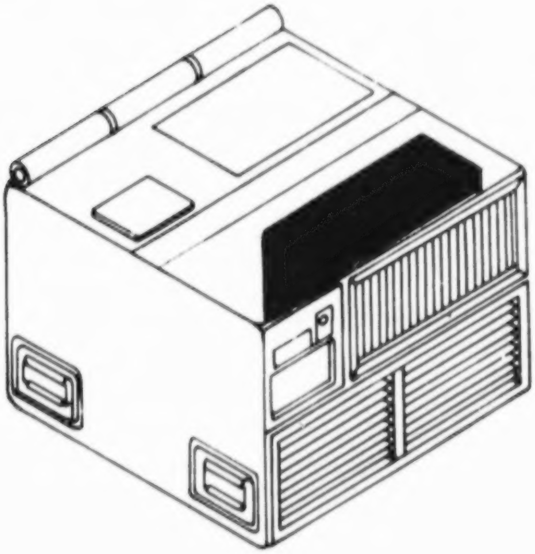
INITIAL SETUP

Equipment Condition Para	Condition Description
4-17	Front Top Cover removed.
4-20	Mist Eliminator removed.

LOCATION/ITEM	ACTION	REMARKS

WARNING

Disconnect air conditioner power supply before doing maintenance work on the electrical system.



4-38. EVAPORATOR COIL ASSEMBLY - SERVICE

LOCATION/ITEM	ACTION	REMARKS
Inspection	a. Check to be sure power is disconnected. b. Check for accumulated dirt. Clean if an accumulation of dirt is evident. c. Check fins for dents, bent edges, or any condition that would block or distort air flow. Straighten all damaged fins with a plastic fin comb. **WARNING** Compressed air used for cleaning purposes will not exceed 30 psi (2.1 kg/cm^2). **CAUTION** Do not use steam to clean coil.	
Cleaning	Clean coil with a soft bristle brush, vacuum cleaner and brush attachment, or use compressed air at 30 psi or less from the inside of the unit to blow the dirt out. Take care to avoid fin damage. When using compressed air, wear safety glasses or goggles. Dirt can be blown into your eyes.	

4-38. SOLENOID VALVES - TEST/REPAIR

This task covers:

a. Test
b. Remove
c. Repair
d. Install

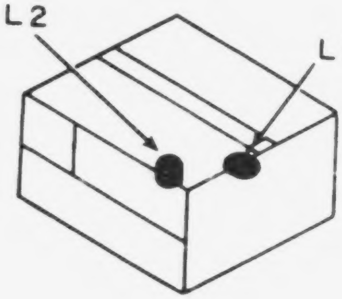
INITIAL SETUP

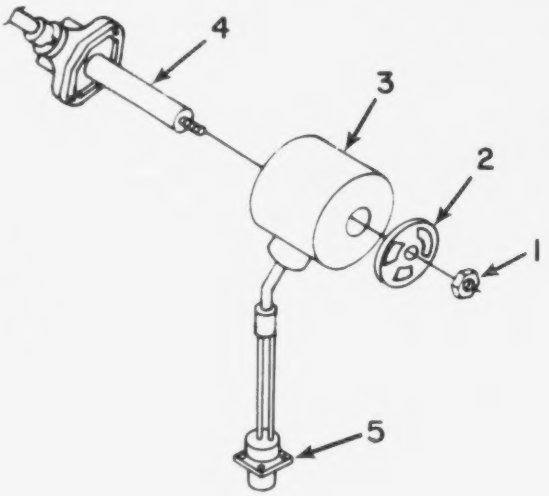
Equipment Condition Para	Condition Description
4-17	Rear and Center Top Covers removed.

Test Equipment
Multimeter
24V Power Supply

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power supply before doing maintenance work on the electrical system.	
	NOTE The following instructions apply to both the equalizing solenoid L2 and the liquid line solenoid L1.	
Test	a. Disconnect wiring harness connector from connector on solenoid valve. b. Use a multimeter set on lowest OHMS scale to check for continuity between contacts A and B in solenoid valve connector. If continuity is not found, coil is open and must be replaced. c. Use multimeter to check for continuity between each contact in solenoid valve connector and coil casing. If continuity is found between either contact and case, the coil is grounded and should be replaced.	

4-38. SOLENOID VALVES - TEST/REPAIR





LOCATION/ITEM	ACTION	REMARKS
Test-Continued	d. If continuity checks are satisfactory, apply 24 volts dc from an external power supply across contacts A and B in solenoid valve connector, and listen for a sharp click when the valve changes position. If a click is not heard, internal valve problems are indicated and entire valve should be replaced (see para 5-19).	
Remove	**WARNING** Do not attempt any disassembly of solenoid valve other than coil removal with a refrigerant charge in the system. Refrigerant will be sprayed out dangerously if screws that attach tube and plunger assembly to valve body are loosened.	

4-38. SOLENOID VALVES - TEST/REPAIR - Continued

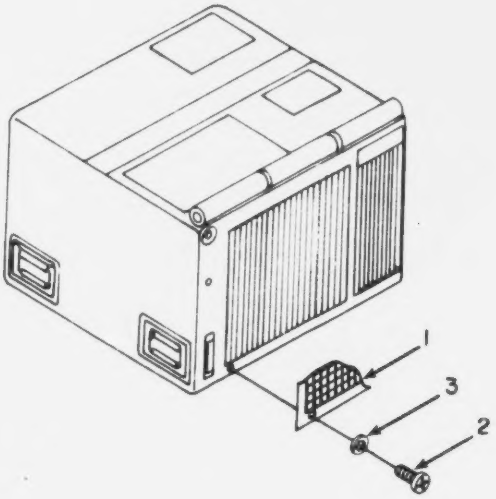
LOCATION/ITEM	ACTION	REMARKS
Remove-(Continued)		
	Remove nut (1) that secures Plate (2) and coil (3) to (valve body (4), and remove coil and connector assembly.	
Repair	a. Unsolder coil leads from pins in the connector, and remove connector (5) . b. Solder the coil leads to the pins in the connector (5).	
Install	a. Install coil (3), connector (5), plate (2), and the attaching nut (1) on valve body (4). b. Connect harness connector to connector on solenoid valve.	
	c. Replace top covers	See paragraph 4-17.

4-39. CONDENSER COIL ASSEMBLY - INSPECT/SERVICE

This task covers:

a. Inspection b. Cleaning

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power supply before doing maintenance work on the electrical system.	
Inspection	a. Remove eight screws (2) and eight lockwashers (3) securing guard (1). Remove guard.	



LOCATION/ITEM	ACTION	REMARKS
	b. Check for accumulated dirt. Clean if an accumlation of dirt is evident.	
	c. Check fins for dents, bent edges, or any condition that would block or distort air flow. Straighten all damaged fins with a plastic fin comb.	

4-39. CONDENSER COIL ASSEMBLY - INSPECT/SERVICE-Continued

LOCATION/ITEM		ACTION	REMARKS
		WARNING Compressed air used for cleaning purposes will not exceed 30 psi (2.1 kg/cm^2). **CAUTION** Do not use steam to clean coil.	
Cleaning			
	a.	Clean coil with a soft bristle brush, vacuum cleaner and brush attachment, or use compressed air at 30 psi or less from the inside of the unit to blow the dirt out. Take care to avoid fin damage. When using compressed air, wear safety glasses or goggles. Dirt can be blown into your eyes.	
	b.	Attach guard (1) and secure with eight screws (2) and eight lockwashers (3).	

4-40. HOUSING - INSPECT/SERVICE

This task covers:

a. Inspection b. Service

INITIAL SETUP

Materials/Parts
Dry Cleaning Solvent (Item 16, App. E)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power supply before doing maintenance work on the electrical system.	
	WARNING Clean parts in well ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent, P-D-680, used to clean parts is potenially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F to 138°F (38°C to 59°C).	
Inspection	Visually inspect the housing for cleanliness, nicks, gouges, dents, bare spots in paint or other defects.	
Service	a. If cleaning is required, wipe off dirt or grime with a cloth moistened with dry cleaning solvent (Item 16, App E). b. Report any necessary repairs to general maintenance personnel.	

4-41. MAIN POWER INPUT CONNECTOR (J1) and AUXILIARY POWER INPUT CONNECTOR (J11) - INSPECT/REPLACE

This task covers:

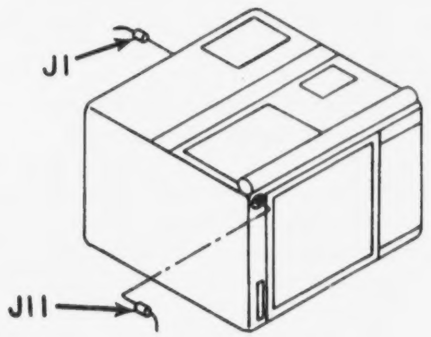
a.	Inspection	d.	Repair
b.	Removal	e.	Installation
c.	Test		

INITIAL SETUP

Equipment Condition Para	Condition Description
4-17	Top Covers removed.
4-18	Evaporator inlet louver removed.

Test Equipment	Materials/Parts
Multimeter	Solder (Item 2, App. E)
Continuity Tester	Flux (Item 15, App. E)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power supply before doing maintenance work on the electrical system.	
Inspection	a. Inspect all installed wiring for cracked or frayed insulation. b. Repair or replace bad wiring. c. Inspect electrical connectors for damage. d. Replace damaged connectors	



4-41. MAIN POWER INPUT CONNECTOR (J1) and AUXILIARY POWER INPUT CONNECTOR (J11) - Continued

LOCATION/ITEM	ACTION	REMARKS
Removal	a. Tag all wire leads prior to removal. b. Remove eight screws eight nuts and eight flat washers to release connector from housing. c. Disconnect all connector plugs and terminals. d. Carefully remove harness from unit.	Use Wiring Diagram. (Appendix F)
Test	a. Test for continuity on wiring harness. b. Touch the test probes of a continuity tester or multimeter, set on low-resistance range, to ends of wire and/or corresponding pin of connector. c. If continuity is not indicated, repair or replace wire or damaged connector.	
Repair	a. Remove the insulation to expose 1/2 inch/1.27 centimeters of bare wire on each side of break or damaged insulation. b. Insert the ends into a splice-connector; splice and crimp the connector to make firm electrical contact. c. Alternatively, heat-shrink tubing may be slipped over one end of the wire before splicing, then heated after the splice is made and soldered, so as to cover the spliced area. d. Be sure that no bare wire is exposed after the splice is complete. e. Replace broken terminal lugs with exact duplicates. f. To replace electrical plugs or connectors, tag and unsolder wires from the solder-wells of the inserts.	

4-41. MAIN POWER INPUT CONNECTOR (J [illegible] and AUXILIARY POWER INPUT CONNECTOR (J11) - Continued

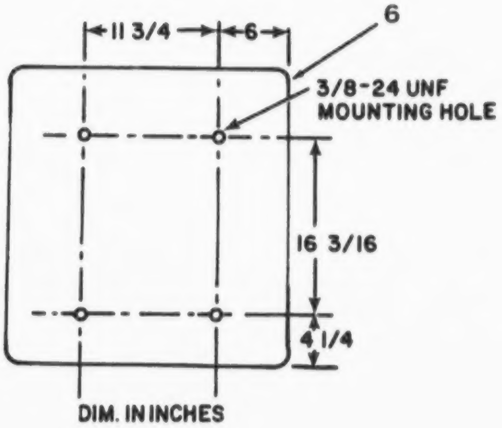
LOCATION/ITEM		ACTION	REMARKS
Repair - (Continued)	g.	Insert bare ends if the wires in corresponding holes of new insert, and solder in place.	
	h.	Check continuity terminal-to-terminal.	
Installation			
	a.	Transfer tags to new harness.	
	b.	Install connector into junction box with nuts and washers.	
	c.	Connect all connector plugs and terminals and remove tags.	Use Wiring Diagram, F-1
	d.	Install junction box.	See paragraph 4-25.
	e.	Install control module.	See paragraph 4-24.
	f.	Install Evaporator Inlet Louver.	See paragraph 4-18.
	g.	Install top covers.	See paragraph 4-17.

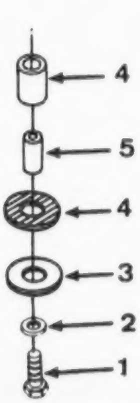
4-42. INSTALLATION HARDWARE - INSPECT/REPLACE

This task covers:

a. Removal
b. Inspection
c. Installation

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power supply before doing maintenance work on the electrical system.	
Removal	a. Remove four screws (1) and flat washers (2) from bottom of air conditioner and enclosure mounting plate (6). b. Remove four resilient mounts (3), four elastomeric tubes (4) and four spacers (5) from bottom of enclosure mounting plate (6). c. Remove air conditioner from atop of four remaining resilient mounts (3) and the enclosure mounting plate (6). d. Remove the remaining four resilient mounts (3) from atop of enclosure mounting plate (6).	





4-42. INSTALLATION HARDWARE - Continued

LOCATION/ITEM	ACTION	REMARKS
Inspection	a. Inspect four screws (1) and flat washers (2) for damage. b. Inspect eight resilient mounts (3), four elastomeric tubes (4) and four spacers (5) for damaged or worn out conditions. c. Replace damaged hardware.	
Installation	a. Assemble onto each of four screws (1), a flat washer (2), a spacer (5), an elastomeric tube (4) and a resilient mount (3). b. Install the above screws, flat washers, spacers, elastomeric tubes and resilient mounts through the bottom of enclosure plate and then install one additional resilient mount (3) on each of the four screws (1), on top of the enclosure mounting plate (6). c. Aline the air conditioner on top of the resilient mounts (3) and screws (1), which attach the air conditioner to the enclosure mounting plate (6). d. Tighten the screws (1) into the bottom of air conditioner.	

Section VI PREPARATION FOR STORAGE OR SHIPMENT

4-43. STORAGE AND SHIPMENT

a. Short Term Storage

(1) Disconnect power supply and remove from shelter.
(2) Make sure unit is clean and dry.
(3) Close all louvers and grilles.
(4) Unroll canvas cover and snap into place.
(5) Store in the operating (upright) position.

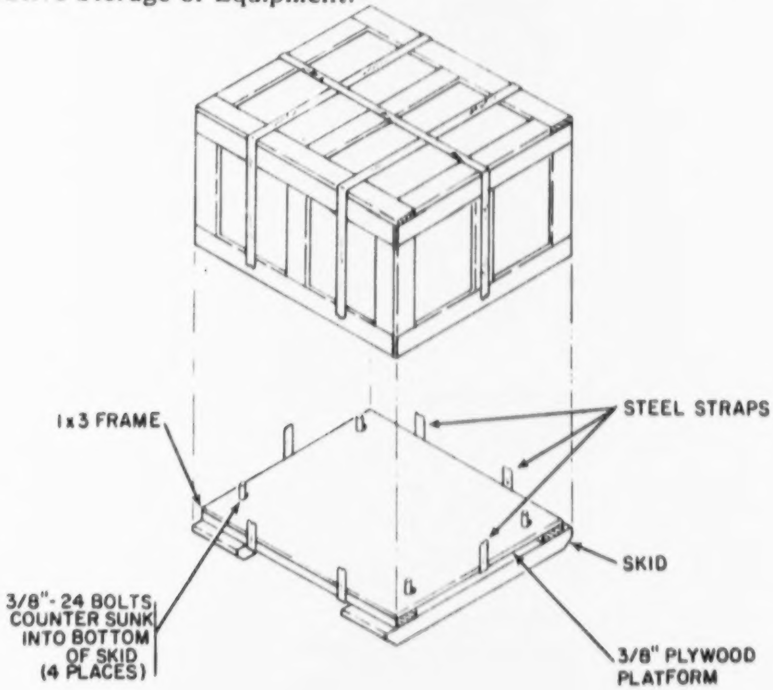
b. Long Term Storage

(1) Disconnect power supply and remove from shelter.
(2) Make sure unit is clean and dry.
(3) Close all louvers and grilles.
(4) Unroll canvas cover and snap into place.
(5) Package all hardware, cable connectors, technical manuals, etc. in a cushioned protective sack. Staple shut and secure to unit.

NOTE

Wrap cable connectors in cushioning material before packaging.

(6) Seal all openings with polyethylene film and 1/2 inch pressure sensitive tape.
(7) Cover the entire unit with a polyethylene film shroud and secure with /2 inch pressure sensitive tape.
(8) Store air conditioner in a dry, dust-free space and in the operating (upright) position.
(9) Storage of the air conditioner will be in accordance with TM 740-90-1, Administrative Storage of Equipment.



4-43. STORAGE AND SHIPMENT - Continued

Shipment - Continued

c. Preparation

Prepare unit as prescribed for long term storage.

d. Shipping Container

(1) Fabricate a wood shipping container conforming to PPP-B-601, Domestic Type. A minimum of 1 inch clearance will exist between the air conditioner and walls of the box. The box will be modified with skids located so that the bolts securing the air conditioner pass through the skids. Bolt heads will be countersunk into the bottom of the skids. The bolts with washers, should protrude at least 3/8 inch above the skid and not more than 1/2 inch.
(2) The air conditioner will be packed in the shipping container and secured to the skids with four bolts (3/8-24) and washers.
(3) Wood spacers will be padded with water resistant cushioning material to prevent abrasion. Corner pads constructed of fiberboard will be used on all top and bottom edges of the air conditioner.
(4) The shipping container will be closed and secured with nails and steel strapping material.
(5) The air conditioner will be stored and shipped in the operating (upright) position. The words "THIS END UP" with arrows will be placed on each side of the shipping container. The letters will be black, at least 3 inches high, and located within the upper third of each side.

CHAPTER 5

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

Section I. DIRECT SUPPORT TROUBLESHOOTING

5-1. GENERAL

a. This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the air conditioner. Each malfunction is followed by a list of probable causes and actions to take to remedy the malfunction. You should perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur; nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

5-2. DIRECT SUPPORT TROUBLESHOOTING

Table 5-1 Direct support troubleshooting

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

---

1. COMPRESSOR WILL NOT START.

Step 1. Make continuity check of control circuit. See Appendix F for control circuit schematic and wiring diagram. (Refer to paragraph 4-24)

Repair loose or broken connections, replace bad components. (Refer to paragraph 4-24, 4-25 and 4-26)

Step 2. Make continuity check of circuit breaker. (Refer to paragraph 4-24)

Replace bad circuit breaker. (Refer to paragraph 4-24)

Step 3. Test starting relay or start capacitor. (Refer to paragraph 4-27 and 4-29)

Step 4. Check continuity or compressor motor leads, and leads to casing using ohmmeter. (Refer to paragraph 5-28)

Replace bad compressor. (Refer to paragraph 5-28)

Step 5. Check continuity of high and low pressure switches at a room temperature. Continuity should exist. (Refer to paragraph 5-22)

If continuity does not exist, press reset button and recheck. Replace faulty high or low pressure switch. (Refer to Paragraph 5-22)

Step 6. Check polarity of power input plug (P1) using voltmeter. With positive (+) lead in pin A and negative (-) lead in pin B, voltage should be 115 VAC. With positive (+) lead pin A and negative (-) lead in pin D, voltage should be 115 VAC. With positive (+) lead in pin B and negative (-) lead in pin D, voltage should be zero volts.

Replace power input plug (P1) which does not pass above test.

Table 5-1 Direct support troubleshooting - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

---

2. COMPRESSOR STARTS, BUT STOPS AT ONCE - "SHORT CYCLES"

Step 1. Test compressor run capacitor. (Refer to paragraph 4-29)

Replace bad compressor run capacitor. (Refer to paragraph 4-29)

Step 2. Inspect evaporator coil for dirt or icing, and check for obstructions at outlet louver. (Refer to paragraphs 4-18 and 4-37)

Clean dirty evaporator coil; defrost in heat mode, or remove obstructions from outlet louver.

Step 3. Check for proper operation of condenser fan and motor.

a. Repair faulty condenser fan/motor. (Refer to paragraph 5-16)

b. Replace bad motor. (Refer to paragraph 4-36)

Step 4. Turn off power; short-circuit ("jumper") the high pressure switch. Turn on power. For maximum of 12 seconds cycle compressor to see whether compressor operates normally.

CAUTION

Do not exceed 12 second operating time for compressor, or vacuum may be formed in suction side or refrigeration system and damage it.

Replace faulty high pressure switch. (Refer to paragraph 5-22)

Step 5. Check dehydrator to see that it is not sweating, frosting or cold to the touch.

If so, replace obstructed dehydrator. (Refer to paragraph 5-26)

Step 6. Check refrigerant system for leaks, using a halogen or electronic leak detector. Refrigerant charge may be low, as indicated by bubbles in liquid sight indicator, or non-condensible gas may have entered system.

If refrigerant charge is low, but no leaks are found, discharge and purge system, repair or replace leaking component, and recharge. (Refer to paragraphs 5-9 through 5-16)

Table 5-1 Direct support troubleshooting - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

---

2. COMPRESSOR STARTS, BUT STOPS AT ONCE - "SHORT CYCLES" - Continued

Step 7. Install pressure gages in system (paragraph 5-4) and check system pressures to see whether an overcharge of refrigerant is indicated.

If overcharge is indicated, partially discharge the system and retest. (Refer to paragraph 5-10)

3. INSUFFICIENT COOLING

Step 1. Feel dehydrator to see whether it is cold to the touch, or is frosted or sweating.

If so, replace dehydrator. (Refer to paragraph 5-26)

Step 2. Check input and discharge sides of solenoid valves for temperature difference. Abnormally cold discharge indicates leakage or obstruction.

Replace faulty solenoid valves. (Refer to paragraph 5-19)

Step 3. Check evaporator coil for over-all temperature.

If part of coil is relatively warm, and evaporator inlet is sweaty or frosty, expansion valve may be obstructed or damaged. (Refer to paragraph 5-18)

Step 4. Check liquid sight indicator for bubbles or cloudiness, which indicates insufficient refrigerant.

Recharge system after checking for and repairing leaks. (Refer to paragraphs 5-3 through 5-10)

Step 5. Check for low discharge pressure to see whether compressor is pumping. (Refer to table 5-2 for normal pressures)

Replace faulty compressor. (Refer to paragraph 5-28)

Table 5-1 Direct support troubleshooting - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

---

4. COMPRESSOR RUNS BUT DOES NOT COOL

Step 1. Check for excessively high temperature in conditioned area.

a. Close doors, windows or other openings.

b. Insulate areas of high heat gain.

Step 2. Check compressor for noisy operation, high suction pressure or excessively low discharge pressure indicating leaky internal valves. (Refer to paragraph 5-10 and table 5-2)

Replace compressor (Refer to paragraph 5-28).

Step 3. Check liquid sight indicator for bubbles indicating low charge of refrigerant.

a. Repair leaks or replace leaking component.

b. Purge and recharge system (Refer to paragraphs 5-3 and 5-10).

Step 4. Check for high discharge pressure (Refer to table 5-2).

Purge or bleed off excess refrigerant; check high-pressure switch or pressure regulator valve.

5. COMPRESSOR EXCESSIVELY NOISY

Step 1. Listen for knocking.

Check for high pressure indicating that liquid refrigerant is returning to compressor (Refer to paragraph 5-10 and table 5-2).

Step 2. Check for high discharge pressure, indicating overcharge of refrigerant (Refer to paragraph 5-10 and table 5-2).

Purge or bleed off excess refrigerant; check high-pressure switch or pressure regulator valve.

Table 5-1 Direct support troubleshooting - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

---

6. SUCTION PRESSURE TOO LOW OR TOO HIGH

Step 1. Stop compressor and check expansion valve as follows:

a. Remove remote bulb from well in suction line.

b. Place bulb in ice water for 1-2 minutes.

c. Start compressor.

d. Remove bulb from ice water and hold it in one hand to warm it. At the same time, check the suction line for rapid change of temperature, which indicates flood-through of liquid refrigerant. If liquid floods through valve, it is operating satisfactorily. If not, valve or remote bulb is faulty.

CAUTION

Do not let liquid flood back into compressor or compressor will be seriously damaged.

e. Replace faulty expansion valve. (Refer to paragraph 5-18)

Step 2. Feel dehydrator for temperature difference. Discharge end will feel cooler than input end if clogged, or discharged end may be frosty or sweaty.

Replace dehydrator. (Refer to paragraph 5-26)

7. LOW HEAT OR NO HEAT

Step 1. Check heater wiring and control circuit for loose connections or broken wires.

a. Tighten loose connections.

b. Replace or repair broken wires (Refer to paragraphs 4-35, 4-24 and 4-26)

Step 2. Check continuity of mode selector switch and temperature selector switch. (Refer to paragraph 4-24)

Table 5-1 Direct support troubleshooting - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

---

7. LOW HEAT OR NO HEAT - Continued

Step 3. Disconnect and remove heater elements, and apply 115-volt ac power to check for open circuit in element. Element should heat.

Replace faulty heating elements (Refer to paragraph 4-35).

Step 4. Check continuity of high-pressure cutout switch at room temperature. Continuity should exist. (Refer to paragraph 5-22)

a. If continuity does not exist, press reset button and recheck. (Refer to paragraph 5-22)

b. Replace faulty switch.

Step 5. Disconnect heater relay. Apply 24-28 volts dc to actuate relay and check continuity at secondary terminals. Continuity should exist. (Refer to paragraph 4-25)

Replace faulty relay. (Refer to paragraph 4-25)

Step 6. Check operation of evaporator fan and motor. (Refer to paragraphs 4-32 and 4-33)

Repair or replace faulty fan or motor. (Refer to paragraphs 4-32, 4-33 and 5-15)

Section II DIRECT SUPPORT MAINTENANCE PROCEDURES

5-3. REFRIGERATION SYSTEM

a. Description

WARNING

Whenever it is necessary to open the refrigeration system for any reason, discharge the refrigerant carefully. Avoid contact with liquid refrigerant. Severe freezing of body tissues can take place with extreme rapidity. Avoid excessive inhalation of refrigerant gas, and ventilate the area in which it is released. Refrigerant gas in contact with flame or hot surfaces is converted to phosgene, a highly toxic gas having an odor similar to newly mown grass or hay.

(1) The refrigeration system, illustrated by the refrigerant flow diagram is a mechanical, vapor-cycle circuit consisting of the evaporator, thermal expansion valve, compressor, condenser, and the necessary valves and cutout devices for automatic control during operation.

(2) The thermal expansion valve releases high-pressure liquid refrigerant into the evaporator at reduced pressure.

(3) The liquid refrigerant begins to vaporize by absorbing heat from the air passing over the outside surface of the evaporator coil.

(4) The heated vapor is sucked out of the evaporator section by the compressor, and is forced into the condenser section under high pressure where it is cooled and condensed back into a liquid.

(5) The heat released during condensation is carried off by the condensing airstream.

(6) The liquid refrigerant flows from the condenser to a receiver, to a subcooler, and then to the thermal expansion valve to repeat the cycle.

(7) If the temperature control switch (evaporator return-air thermostat) becomes satisfied or the evaporator return-air temperature is lower than the point at which you have set the control, the refrigeration system will switch to a by-pass condition.

5-3. REFRIGERATION SYSTEM - Continued

(8) The temperature control switch will activate the normally open liquid by-pass solenoid valve, and shut off the evaporator section of the unit. You will notice that compressor will continue to pump as usual, and the suction pressure will begin to drop.

(9) When the suction pressure reaches about 65 PSIG (4.6 kg/cm^2), the valve starts to open in an effort to maintain the suction pressure above about 55 PSIG. (3.86 kg/cm^2)

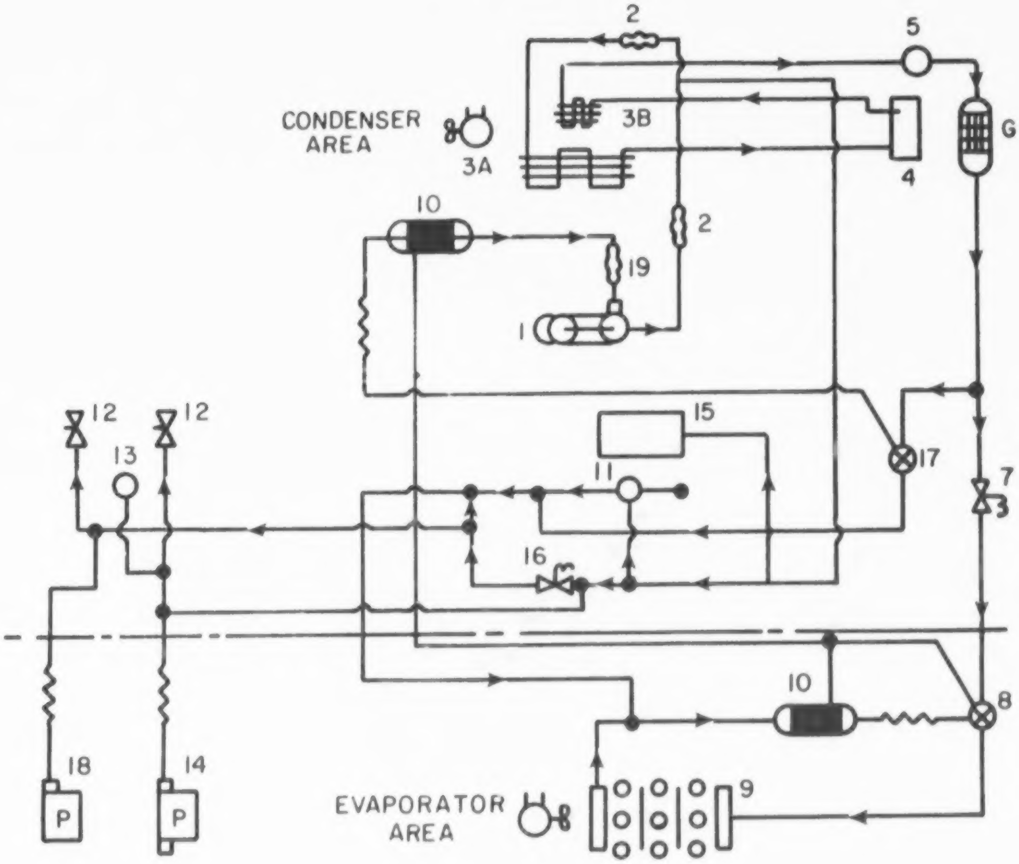
(10) As the suction temperature goes up, due to the opening of the pressure regulating valve, the quench expansion valve will start to meter liquid refrigerant into the suction line to maintain the suction temperature below 75°F (24°C).

(11) The action of the pressure regulating valve and quench valve is automatic. This action may also occur at extreme conditions in an attempt to maintain the suction pressure (even during the cooling mode) at a point above 55 PSIG (3.86 kg/cm^2) and the suction temperature (measured at the quench bulb well) below 75°F (24°C).

(12) The condenser louvers are operated by a refrigerant-powered actuator located in the high-pressure part of the system. This actuator should be fully extended (louvers open) at approximately 80°F (27°C) at 260-220 PSIG (18.3-15.5 kg/cm^2) discharge pressure, and fully closed at 180-150 PSIG (12.67-10.56 kg/cm^2). Failure to perform this function could result in cutout on the high pressure cutout switch.

b. Refrigeration System Repair

The following paragraphs contain repairs covering commonly used hardware, the tubing and valves of the refrigeration system. Re-use or repair of seals and gaskets should not be attempted; new parts should be used at assembly. When heating refrigeration piping to debraze or unsolder connections (See paragraph 5-6) as well as to solder or braze them, the piping should be protected with a continuous flow of dry nitrogen to prevent scaling or oxidation of the inside surface.


2
5
CONDENSER AREA
3B
G
3A
4
10
2
19
1
12
12
13
15
11
17
7
16
10
8
18
P
14
P
EVAPORATOR AREA
9

	DESCRIPTION
1	COMPRESSOR, RECIPROCATING
2	HOSE ASSY,METAL
3A	COIL,CONDENSER W/ANGLE
3B	SUB COOLER
4	RECEIVER,LIQUID REFRIGERANT
5	INDICATOR,SIGHT,LIQUID
6	DEHYDRATOR,DESICCANT, REFRIGERANT
7	SOLENOID,VALVE W/LEADS
8	VALVE,EXPANSION (PRIMARY)
9	COIL,EVAPORATOR

	DESCRIPTION
10	BULBWELL
11	REGULATOR,FLUID PRESSURE
12	VALVE,SERVICE
13	VALVE,PRESSURE RELIEF
14	SWITCH,PRESSURE (HIGH)
15	CYLINDER ASSY,ACTUATING LINEAR
16	SOLENOID VALVE W/LEADS
17	VALVE,EXPANSION (QUENCH)
18	SWITCH,PRESSURE (LOW)
19	HOSE ASSY,METAL

5-4. REFRIGERATION SYSTEM SERVICING - (DISCHARGING)

This task covers: Service

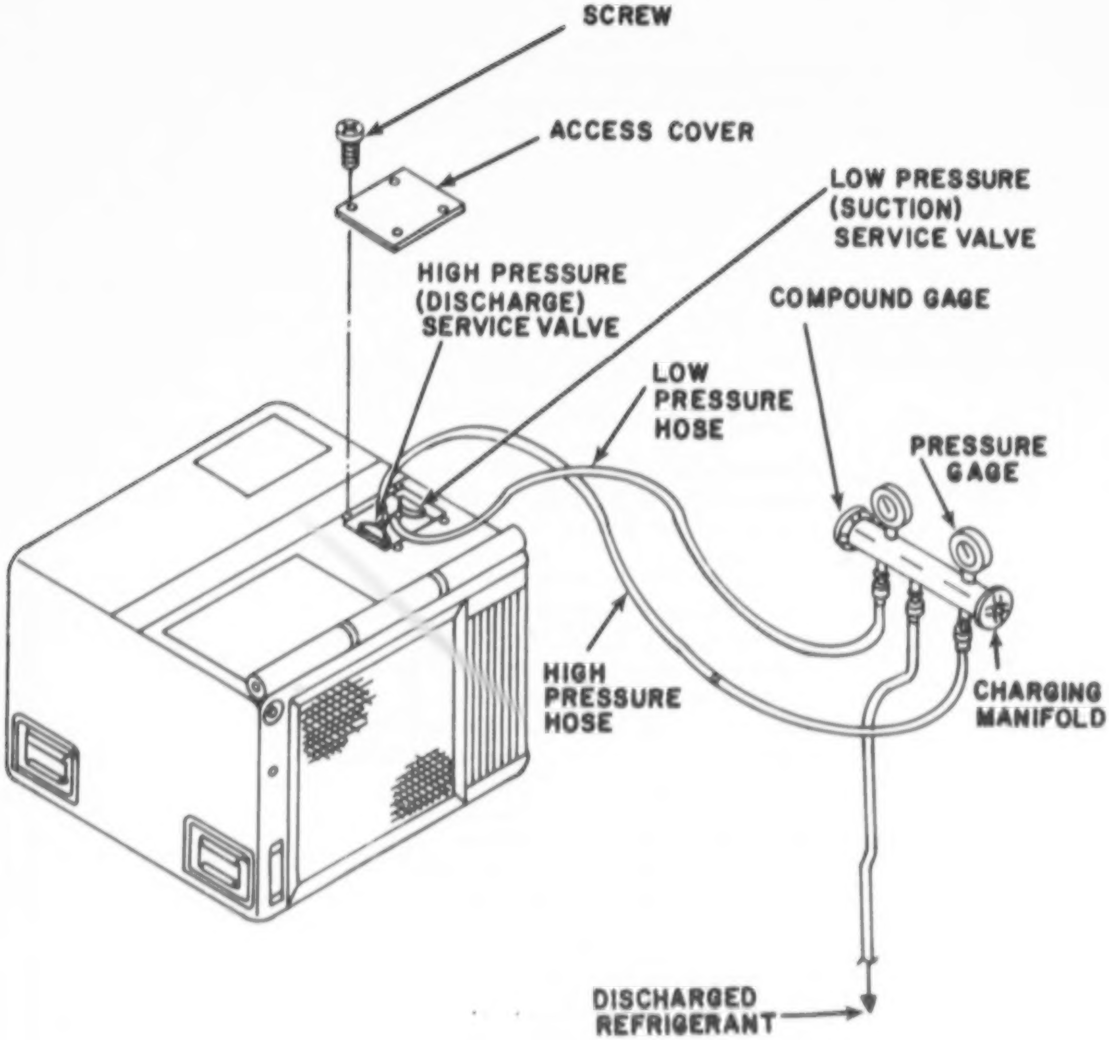
INITIAL SETUP

Equipment Condition Para	Condition Description
	Mode selector switch in off position.
	Main power source is disconnected.
4-17	Panels removed.

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power supply before doing maintenance work on or near electrical components or junction box compartment.	
REAR TOP OF UNIT Service	a. Remove screws from service valve access cover. b. Remove service valve access cover. c. Unscrew hose connection protective caps from service valves.	
	WARNING Death or serious injury may result if personnel fail to observe safety precautions. Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged under pressure. Sudden and irreversible tissue damage can result from freezing. Wear thermal protective gloves and a face protector or goggles in any situation where skin-eye contact is possible.	

5-4. REFRIGERATION SYSTEM SERVICING - (DISCHARGING) - Continued

LOCATION/ITEM	ACTION	REMARKS
	WARNING Prevent contact of refrigerant gas with flame or hot surfaces, Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly poisonous and corrosive gas.	
Service – Continued	d. Connect the charging manifold hoses to the manifold and air conditioner service valves. e. Attach a hose assembly to the center connection of the manifold. f. Place the open end of the center connection hose in a container that is located in a well ventilated area. **WARNING** Discharge refrigerant in an open area and not around an open flame. **CAUTION** Do not permit the oil to escape from the unit. If oil is escaping, close the valve(s) slightly. Do not permit the refrigerant to escape fast enough to form ice or frost on either the lines or the valve. g. Slowly open the low pressure service valve to allow refrigerant gas to flow slowly out of the hose. h. Slowly open high pressure service valve to allow refrigerant gas to flow slowly out of the hose. i. Check the discharge hose for the presence of oil. Adjust (close slightly) valves if necessary to prevent oil discharge. j. When gas stops flowing, close both service valves.	


SCREW
ACCESS COVER
LOW PRESSURE (SUCTION) SERVICE VALVE
HIGH PRESSURE (DISCHARGE) SERVICE VALVE
COMPOUND GAGE
LOW PRESSURE HOSE
PRESSURE GAGE
HIGH PRESSURE HOSE
CHARGING MANIFOLD
DISCHARGED REFRIGERANT

5-5. REFRIGERATION SYSTEM SERVICING - (PURGING)

This task covers: Service

INITIAL SETUP
Equipment
Condition

Para	Condition Description
5-4	Refrigerant system discharged. Main power source disconnected.

Materials/Parts
Nitrogen (App. E. Item 4)

LOCATION/ITEM	ACTION	REMARKS

WARNING

Disconnect air conditioner power supply before doing maintenance work on or near electrical system.

WARNING

The refrigeration system must be purged with dry nitrogen, App. E, Item 4, during any brazing operation performed on any component. A flow of dry nitrogen at the rate of less than 1 - 2 cfm (0.028-0.057 m^3/minute) should be continued during all brazing operations to minimize internal oxidation and scaling.

CAUTION

Nitrogen cylinders are pressurized containers. The pressure in the cylinder can exceed 2000 PSI. A nitrogen pressure regulator should be used at all times when nitrogen is used for leak check or purge operations.

5-5. REFRIGERATION SYSTEM SERVICING - (PURGING) - Continued

LOCATION/ITEM	ACTION	REMARKS

CAUTION

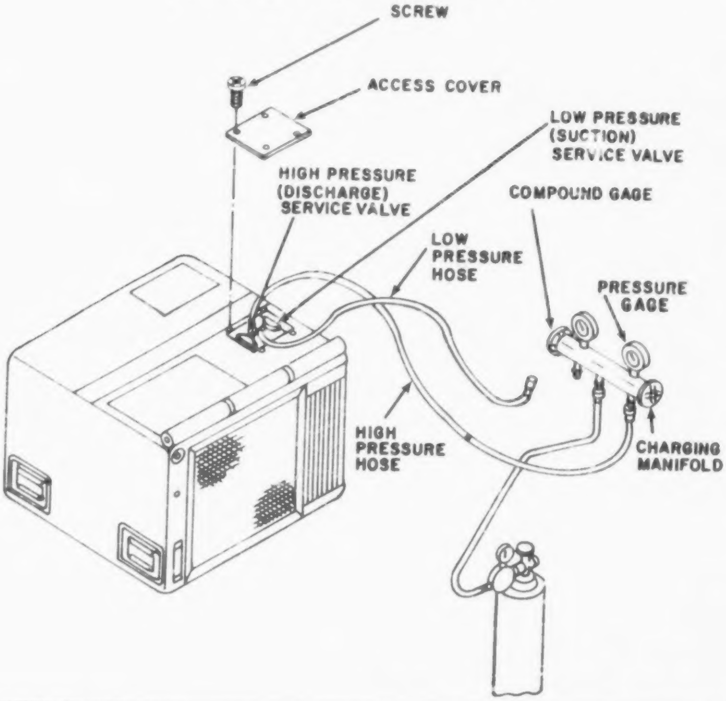
Nitrogen is an inert gas. However, it also presents danger as a suffocant and therefore, must also be discharged in a ventilated location.

Assuming that the system has been discharged using a manifold as described in paragraph 5-4, proceed as follows:

a. See specific component removal/ repair instructions.
b. Be sure that refrigerant has been discharged. (See paragraph 5-4)
c. Connect the center hose from the charging manifold to a nitrogen regulator and dry nitrogen tank.
d. The hose from the high pressure service valve to the charging manifold must be connected.
e. The hose from the low pressure service valve must be disconnected from the charging manifold.
f. Open both service valves on the unit.
g. Close the unused valve on the charging manifold, and open the one with the nitrogen tank hooked up.
h. Open the nitrogen cylinder valve and adjust the regulator so that less than 1-2 cfm (0.028-0.057 m^3/ minute) of nitrogen flows through system.
i. Check discharge from hose attached to the low pressure service valve to be sure that no oil is being forced out of the system.

5-5. REFRIGERATION SYSTEM SERVICING - (PURGING) - Continued

LOCATION/ITEM	ACTION	REMARKS
	j. Allow nitrogen to sweep through the system at the rate of less than 1-2 cfm (0.028-0.057 m^3/minute) for a minimum of 5 minutes, before starting any brazing operation. Then allow it to continue to flow at the same rate until all brazing operations are completed. (See paragraph 5-6 for brazing/debrazing procedures). k. After installation brazing operations are completed, allow nitrogen to flow for a minimum of 5 minutes. l. Close nitrogen cylinder valve, nitrogen regulator, charging manifold valve, and both low and high pressure service valves on the unit. m. Disconnect the hose from the nitrogen tank. n. Assuming that all repairs are completed, go to paragraph 5-7.	


SCREW
ACCESS COVER
LOW PRESSURE (SUCTION) SERVICE VALVE
HIGH PRESSURE (DISCHARGE) SERVICE VALVE
COMPOUND GAGE
LOW PRESSURE HOSE
PRESSURE GAGE
HIGH PRESSURE HOSE
CHARGING MANIFOLD

5-6. REFRIGERATION SYSTEM SERVICING - (BRAZING/DEBRAZING)

This task covers: Service

INITIAL SETUP

Equipment Condition

Para	Condition Description
5-4	Refrigeration system discharged.
5-5	Refrigeration system purged.
	Main power source disconnected.

Materials/Parts

Brazing alloy (silver) (App. E, Items 5 & 6)
Nitrogen cylinder (App. E, Item 4)
Brazing flux (App. E, Item 7
Abrasive cloth (App. E, Item 8)
Rags (App. E, Item 9)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power supply before doing maintenance work on or near electrical system. a. General. All tubing in the refrigeration system is copper with a finish that permits thorough cleaning. All interconnecting fittings, such as elbows, tees, etc., are also copper. The bodies of all valves and all connections on other components are brass. All joints, except those provided with flare fittings, are made by brazing in accordance with MIL-B-7883, except that radiographic examination is not required.	

5-6. REFRIGERATION SYSTEM SERVICING - (BRAZING/DEBRAZING) - Continued

LOCATION/ITEM	ACTION	REMARKS
	b. Filler Alloy. Grade IV or VI brazing alloy and Type B flux, as specified in MIL-B-7883, must be used for all copper to brass joints. Grade III brazing alloy may be substituted for Grade IV or VI for copper to copper joints; flux is not required for copper to copper joints. c. Debrazing. Debraze joints for removal of refrigeration system components as follows: **WARNING** All refrigerant-22 must be discharged from the system and the entire system must be purged with dry nitrogen before beginning any debrazing operation. (1) Determine which joints are to be debrazed. Due to the limited work space inside the air conditioner, it may be more convenient to remove a part of the interconnecting tubing with the component rather than debrazing the joints on the component itself. (2) Before debrazing a joint on a valve, disassemble the valve to the extent possible, then wrap all but the joint with a wet rag to act as a heat sink.	

5-6. REFRIGERATION SYSTEM SERVICING - (BRAZING/DEBRAZING) - Continued

LOCATION/ITEM	ACTION	REMARKS
	WARNING The polyurethane foam used as insulation in the air conditioner will break down to form toxic gasses if exposed to the flame of a torch at brazing temperature. (3) Protect insulation, wiring harnesses, cabinet, and other surrounding components with appropriate shields. (4) Be sure the work area is well ventilated and that dry nitrogen is flowing through the refrigeration system at a rate of less than 1-2 cfm (0.028-0.057 m^3/minute.) (5) Apply sufficient heat uniformly around the joint to quickly melt the filler alloy. If heat is applied slowly, or only on one side, the entire component or length of tubing will be heated and filler alloy in adjacent joints may also be melted. Remove heat as soon as the joint separates. d. Cleaning debrazed joints. All filler alloy must be cleaned from debrazed joints before reassembly. Heat each piece of the joint until the filler alloy is melted and then wipe it away with a dry cloth. Be sure no filler alloy or other debris are left inside any tubing, fitting or component. e. Reassembly. If tubing sections or fittings were removed with a component, debraze them from the component, clean the joints, and braze them to the new component before reinstallation.	

5-6. REFRIGERATION SYSTEM SERVICING - (BRAZING/DEBRAZING) - Continued

LOCATION/ITEM	ACTION	REMARKS
	f. Brazing. Braze joints within the air conditioner as follows: (1) Position the component to be installed. (2) To prepare a joint on a valve for brazing, disassemble the valve to the extent possible. Then wrap all but the joint with a wet rag to act as a heat sink. (3) Protect insulation, wiring harnesses, and surrounding components with appropriate shields. (4) Be sure the work area is well ventilated and that dry nitrogen is flowing through the refrigeration system at a rate of less than 1-2 cfm (0.028-0.057 m^3/minute). (5) Apply sufficient heat uniformly around the joint to quickly raise it to a temperature that will melt the filler alloy. Remove heat as soon as brazing is completed.	

5-7. REFRIGERATION SYSTEM SERVICING - (LEAK TEST)

This task covers: Test

INITIAL SETUP

Equipment Condition

Para	Condition Description
	Main power source disconnected.

Test Equipment

Electronic refrigerant gas leak detector

Materials/Parts

Nitrogen (App.E, Item 4)
Refrigerant R-22 (App.E, Item 10)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power input connector before doing maintenance work on electrical system. a. The entire repaired area should be thoroughly leak tested after repair or replacement of any component, before it is recharged with refrigerant-22. Leak testing is also the method for troubleshooting when a system has lost all or part of its refrigerant charge through an undetermined cause. b. Testing Method. There are two acceptable methods for leak testing the refrigeration system.	

5-7. REFRIGERATION SYSTEM SERVICING - (LEAK TEST) - Continued

LOCATION/ITEM	ACTION	REMARKS
	(1) Refrigerant gas leak detector. If an electronic refrigerant gas leak detector is available it should be used in accordance with the procedures contained in TM 9-4940-435-14, "Leak Detector, Refrigerant Gas." NOTE The electronic refrigerant gas leak detector is highly sensitive to the presence of a minute quantity of gas in the air, due to this factor is quite effective in the detection of a small leak. However, due to the rapid dispersion of refrigerant gas into the surrounding air, difficulty may be encountered in pinpointing large leaks. The detector must be used in a well ventilated but draft-free area. (2) Soap solutions. In this method, a strong solution of a liquid detergent and water is brushed onto all points of possible leakage while closely watching for the formulation of bubbles. **CAUTION** If the soap solution testing method is used, thoroughly rinse with fresh water after testing is completed. A residual soap film will attract and accumulate an excessive amount of dust and dirt during operation.	

5-7. REFRIGERATION SYSTEM SERVICING - (LEAK TEST) - Continued

LOCATION/ITEM	ACTION	REMARKS
	c. Testing procedures. To perform leak testing by use of the electronic detector, it is necessary that the system be pressurized with a proportion of refrigerant gas. To perform leak testing by use of the soap solution method, the system may be pressurized with dry nitrogen alone. (1) To pressurize a system that has some refrigerant charge, for either leak testing method: (a) Remove the hose connection protective caps from the high and low pressure service valves. (b) Connect the hoses from a charging manifold to the service valves. NOTE If it is possible that the problem may not be a leak and that you may not nave to replace a refrigeration system component, refrigerant-22 may be substituted for the nitrogen in the following test. If nitrogen is used, you will have to discharge, evacuate, and recharge the system after this test is completed. (c) Connect a nitrogen pressure regulator and nitrogen bottle to the center hose connection of the charging manifold. (d) Open the unit service valves and the charging manifold valves.	

5-7. REFRIGERATION SYSTEM SERVICING - (LEAK TEST) - Continued

LOCATION/ITEM	ACTION	REMARKS
	(e) Open the nitrogen tank valve and pressurize the system to 300 PSIG (21.2 kg/cm^2) (f) Perform leak tests. (g) If a leak is found, discharge and purge the system and repair leak. See specific instructions for components to be removed. (h) If a leak was not found and refrigerant-22 was used to pressurize the system, see charging instructions. (See paragraph 5-9). (2) To pressurize a system that has been discharged and purged for leak testing with an electronic detector: (a) Remove the hose connection protective caps from the high and low pressure service valves. (b) Connect the hoses from a charging manifold to the service valves. (c) Connect a cylinder of refrigerant-22 to the center hose connection of the charging manifold. **CAUTION** Connect the refrigerant-22 cylinder so that only gas will be used for pressurization. (d) Open both unit service valves and the charging manifold valves.	

5-7. REFRIGERATION SYSTEM SERVICING - (LEAK TEST) - Continued

LOCATION/ITEM	ACTION	REMARKS
	(e) Open the refrigerant cylinder valve slightly and adjust as necessary to prevent formation of frost, and allow system pressure to build up until the gages read 40-50 PSI (2.8-3.5 kg/cm^2)	
	(f) Close the charging manifold valves and the refrigerant cylinder valve.	
	(g) Remove the refrigerant-22 cylinder from the center hose connection.	
	(h) Connect a nitrogen regulator of dry nitrogen to the center hose connection.	
	(i) Open the charging manifold valves and the nitrogen cylinder and regulator valve. Allow system pressure to build up until gages read 300 PSIG (21.2 kg/cm^2)	
	(j) Perform leak tests, then discharge and purge the system, in accordance with paragraphs 5-4 and 5-5 before performing maintenance, or before evacuating and charging the system, as appropriate.	
(3)	Final leak testing. Always perform a final leak test after performing any repair or replacement of components before the air conditioner is reassembled and the refrigeration system is evacuated and charged.	

5-8. REFRIGERATION SYSTEM SERVICING - (EVACUATION)

This task covers: Evacuation

INITIAL SETUP

Equipment Condition

Para	Condition Description
5-7	Refrigerant System Leak Tested.
5-4	Refrigerant System Discharged.

Test Equipment

Vacuum Pump

Materials/Parts

Nitrogen (App.E, Item 4)

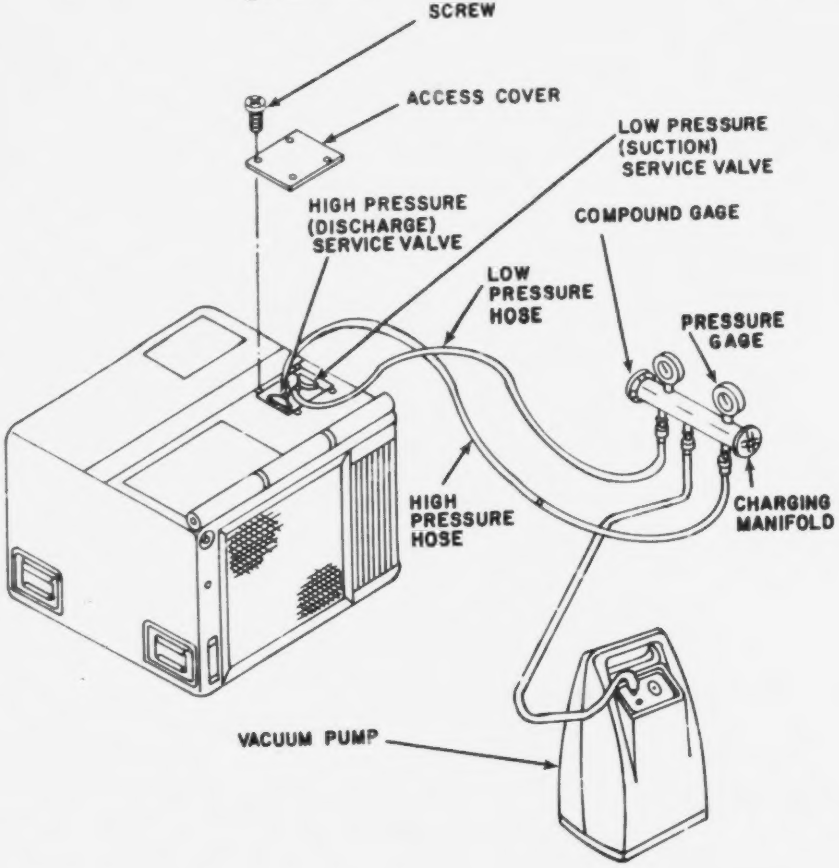
LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power supply before doing any maintenance work on the electrical system.	
	NOTE Replace dehydrator whenever refrigerant system is opened.	
	CAUTION Do not evacuate a leaking system. The vacuum created can cause air, moisture, and dirt to enter system.	
	NOTE In the event the compressor was replaced as a result of burn-out, check that compressor burn out procedures were followed.	See paragraph 5-28.

5-8. REFRIGERATION SYSTEM SERVICING - (EVACUATION) - Continued

LOCATION/ITEM	ACTION	REMARKS
	a. Connect the hose from the low pressure service valve to the compound gage side of the charging manifold. The hose from the high pressure service valve shall be connected to the high pressure gage side of the charging manifold.	
	b. Open both service valves.	
	c. Attach center hose assembly charging manifold to vacuum pump.	
	d. Start vacuum pump.	
	e. Open charging manifold valves.	
	f. Run the vacuum pump until approximately a 300 micron vacuum is reached.	
	NOTE Inability to reach 300 microns may indicate either a leak or a problem with the pump.	
	g. Close manifold valves and check compound gage. Record reading. Let unit sit for one hour. Observe compound gage reading.	
	h. If the system holds the vacuum without change of pressure, proceed to step j.	
	i. If the vacuum cannot be held for one hour, one of the following reasons may account for the problem:	
	(1) Presence of water vapor in the system. Continued pumping will correct this condition.	
	(2) Leak in the refrigeration system. Break the vacuum with dry nitrogen and retest for leaks.	See paragraph 5-7.

5-8. REFRIGERATION SYSTEM SERVICING - (EVACUATION) - Continued

LOCATION/ITEM	ACTION	REMARKS
	(3) Internal leakage of vacuum pump. Test the pump by connecting a vacuum gage directly to the vacuum pump intake and continue to pump. If pump still fails to reach approximately 300 microns, the pump is faulty.	
	j. Close both unit service valves.	
	k. Close charging manifold valves.	
	l. Stop vacuum pump.	
	m. Disconnect pump from center hose connection.	
	n. Charge system with refrigerant-22.	See paragraph 5-9.


SCREW
ACCESS COVER
LOW PRESSURE (SUCTION) SERVICE VALVE
HIGH PRESSURE (DISCHARGE) SERVICE VALVE
COMPOUND GAGE
LOW PRESSURE HOSE
PRESSURE GAGE
HIGH PRESSURE HOSE
CHARGING MANIFOLD
VACUUM PUMP

5-9. REFRIGERATION SYSTEM SERVICING - (CHARGING)

This task covers: Charging Refrigeration System

INITIAL SETUP

Equipment Condition

Para	Condition Description
5-8	Refrigeration System Evacuated

Test Equipment

Charging Cylinder or Scale

Materials/Parts

Refrigerant-22, R-22
(App.E, Item 10)

LOCATION/ITEM	ACTION	REMARKS

WARNING

Disconnect air conditioner power supply before doing any maintenance work on the electrical system.

CAUTION

Never introduce liquid refrigerant into the low pressure (suction) service valve.

NOTE

Install top covers before charging unit.

NOTE

The system must be evacuated before charging. Using only refrigerant-22 to charge the unit;

best copy available

5-9. REFRIGERATION SYSTEM SERVICING – (CHARGING) – Continued

LOCATION/ITEM	ACTION	REMARKS
	a. Connect the hose from the low pressure service valve to the compound gage side of the charging manifold. The hose from the high pressure service valve should be connected to the high pressure gage side of the manifold.	
	b. Connect the center hose from the charging manifold to a well charged cylinder of refrigerant-22, or a charging cylinder.	
	c. Loosen the hose connections to the two service valves slightly.	
	d. Open the two charging manifold valves.	
	e. Open the refrigerant-22 or charging cylinder valve slightly to allow a small amount of refrigerant to purge air from the hoses. Tighten the hose connections at the air conditioner service valve.	
	f. Close the low pressure (suction) charging manifold valve.	
	g. Position the refrigerant-22 cylinder so that liquid will be used for charging. (Some cylinders must be inverted and some are equipped with a selection valve).	
	h. Using accurate scales, measure and record the weight of the charged refrigerant-22 cylinder.	
	i. Fully open the refrigerant-22 cylinder valve.	

5-9. REFRIGERATION SYSTEM SERVICING - (CHARGING) - Continued

LOCATION/ITEM	ACTION	REMARKS
	j. Open the high pressure service valve on the air conditioner. Allow liquid refrigerant to enter the system until the charged refrigerant cylinder weight has decreased by 2.875 pounds (1.15 kg) or until system pressure has equalized.	
	k. Close the refrigerant cylinder valve and the high pressure (discharge) manifold valve.	
	l. Connect power to air conditioner.	
	m. Press and release both pressure switch reset buttons.	
	n. Turn air conditioner on and operate in the COOL mode with the temperature control thermostat set at a maximum COOLER position.	
	o. If the 2.875 pounds (1.15 kg) full charge was obtained, skip steps o through r. If the system pressure equalized prior to obtaining a full charge of 2.875 pounds (1.15 kg) proceed with step p.	
	p. Switch the refrigerant cylinder valve, the low (suction) pressure charging manifold valve, and the low (suction) pressure service valve on the air conditioner.	
	q. Open the refrigerant cylinder valve, the low (suction) pressure charging manifold valve, and the low (suction) pressure service valve on the air conditioner.	
	r. Monitor the weight of the refrigerant cylinder as the air conditioner compressor pulls additional refrigerant gas into the system until the full 2.875 pounds (1.15 kg) charge is obtained. When the system is fully charged immediately close the refrigerant cylinder valve.	

5-9. REFRIGERATION SYSTEM SERVICING - (CHARGING) - Continued

LOCATION/ITEM	ACTION	REMARKS

s. Run the air conditioner in COOL mode with temperature control thermostat in full COOLER position for 15 minutes.

NOTE

Do not skip the next step.

t. After 15 minutes, observe the liquid sight indicator (sight glass) on left rear of unit.
- Green center means the refrigerant moisture content is acceptable.
- Yellow center means there is too much moisture in the system. It must be discharged, evacuated and charged again.
- Milky white or bubbly liquid means the system has a low charge.
- Clear bubble-free liquid around the center means the system is fully charged.

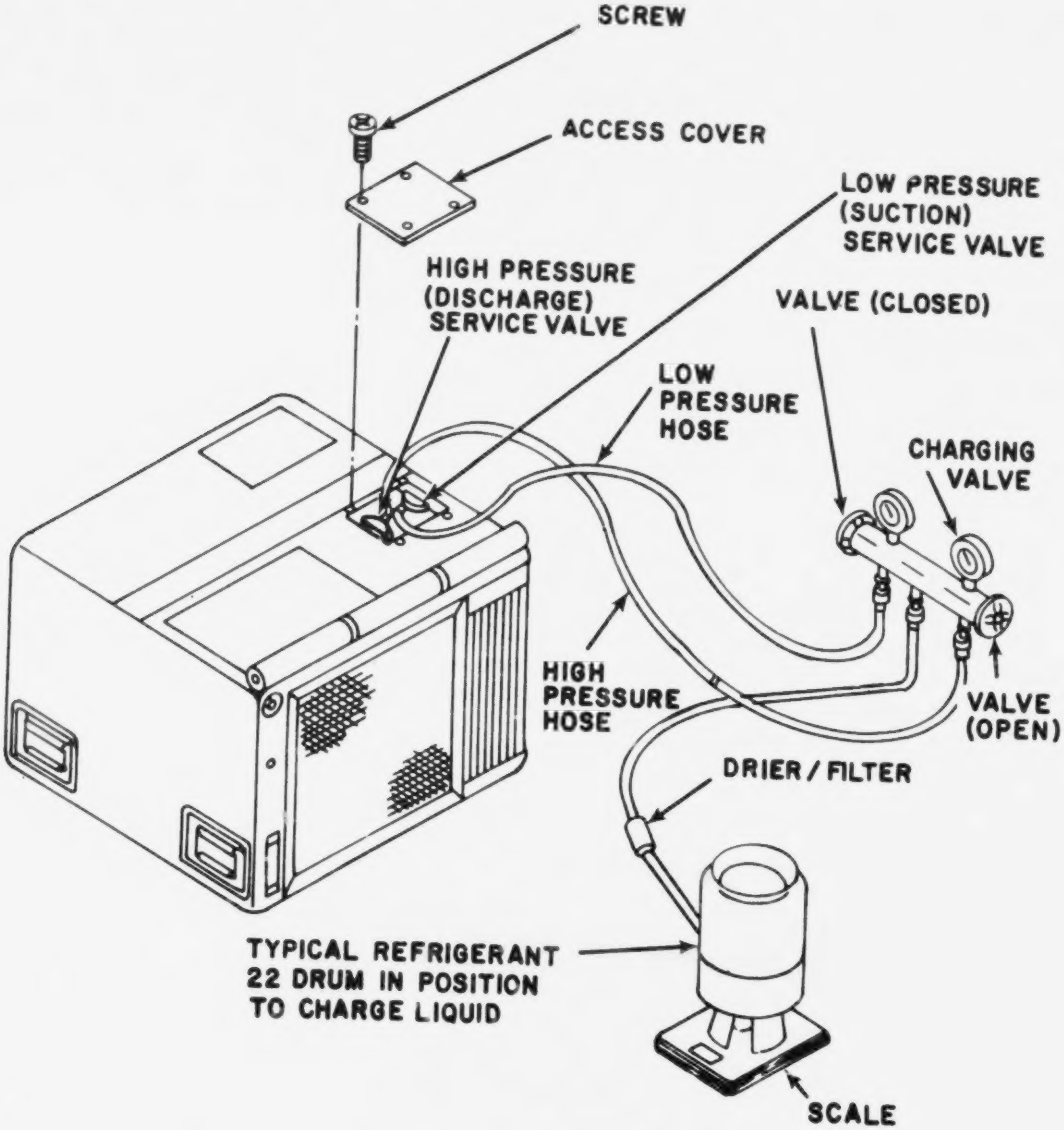
u. If charge is low, add gas refrigerant.
- Switch refrigerant cylinder to vapor position. Open cylinder valve and the manifold low pressure valve.

v. Check air conditioner for proper cooling. There should be at least a 5°F temperature difference between evaporator discharge air and inlet air. Turn mode selector switch to OFF.

w. Close the high and low pressure service valves and remove charging manifold hoses.

x. Install service valve protective caps.

y. Secure service valve access cover using four screws.


SCREW
ACCESS COVER
LOW PRESSURE (SUCTION) SERVICE VALVE
HIGH PRESSURE (DISCHARGE) SERVICE VALVE
VALVE (CLOSED)
LOW PRESSURE HOSE
CHARGING VALVE
HIGH PRESSURE HOSE
VALVE (OPEN)
DRIER / FILTER
TYPICAL REFRIGERANT 22 DRUM IN POSITION TO CHARGE LIQUID
SCALE

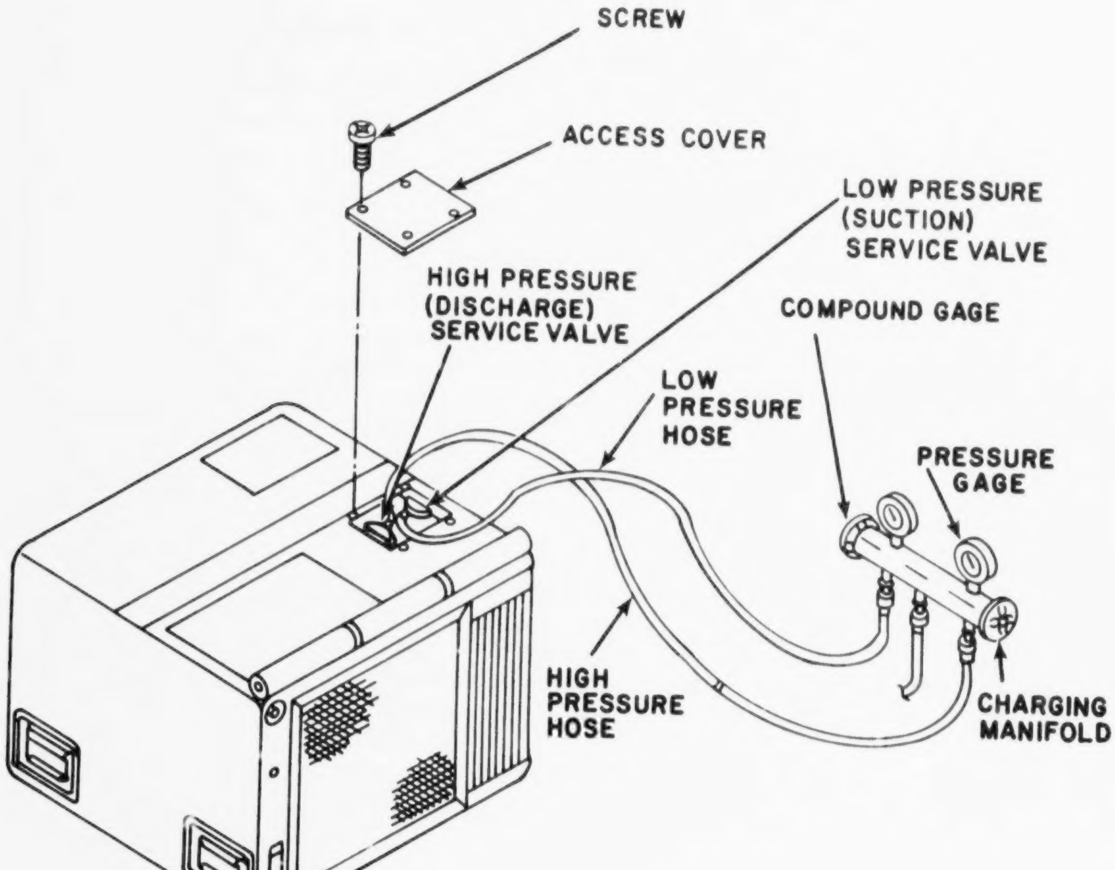
5-10. REFRIGERATION SYSTEM SERVICING - (PRESSURE TESTING)

This task covers: Test

LOCATION/ITEM	ACTION	REMARKS
	WARNING Check to see that power is disconnected.	
1. Service Valve Access Cover	a. Remove screws from service valve access cover. b. Remove service valve access cover.	
2. Charging Valve Caps	Remove caps from high and low pressure service valves.	
3. Refrigeration System Pressure	a. Connect low pressure gage hose of manifold valve to suction service valve. b. Connect high pressure hose of manifold valves to discharge service valve. c. Purge hoses - open discharge and suction service valves. d. Check that manifold valves are closed. e. Start air conditioner. f. Compare gage readings with the normal range of system pressure as shown on the following table.	

Table 5-2. Normal Temperature – Pressure Relationships

Temperatures		Pressure Range (PSIG)		
Outdoor Ambient	50°F (10°C)	75°F (24°C)	100°F (38°C)	125°F (52°C)
90°F (32°C) Return Air to Unit (Dry Bulb)	55–65 Suction 125–160 Discharge	59–70 Suction 175–210 Discharge	60–75 Suction 255–295 Discharge	75–90 Suction 370–425 Discharge
80°F (27°C) Return Air to Unit (Dry Bulb)	58–65 Suction 120–155 Discharge	58–70 Suction 170–205 Discharge	60–75 Suction 250–290 Discharge	65–75 Suction 370–425 Discharge


SCREW
ACCESS COVER
LOW PRESSURE (SUCTION) SERVICE VALVE
HIGH PRESSURE (DISCHARGE) SERVICE VALVE
COMPOUND GAGE
LOW PRESSURE HOSE
PRESSURE GAGE
HIGH PRESSURE HOSE
CHARGING MANIFOLD

5-10. REFRIGERATION SYSTEM SERVICING – (PRESSURE TESTING) – Continued

LOCATION/ITEM	ACTION	REMARKS
	g. Close discharge and suction service valves.	
	h. Disconnect gages.	
	i. Install service valve access cover with screws.	

5-11. CANVAS COVER AND PANELS - REPAIR/REPLACE

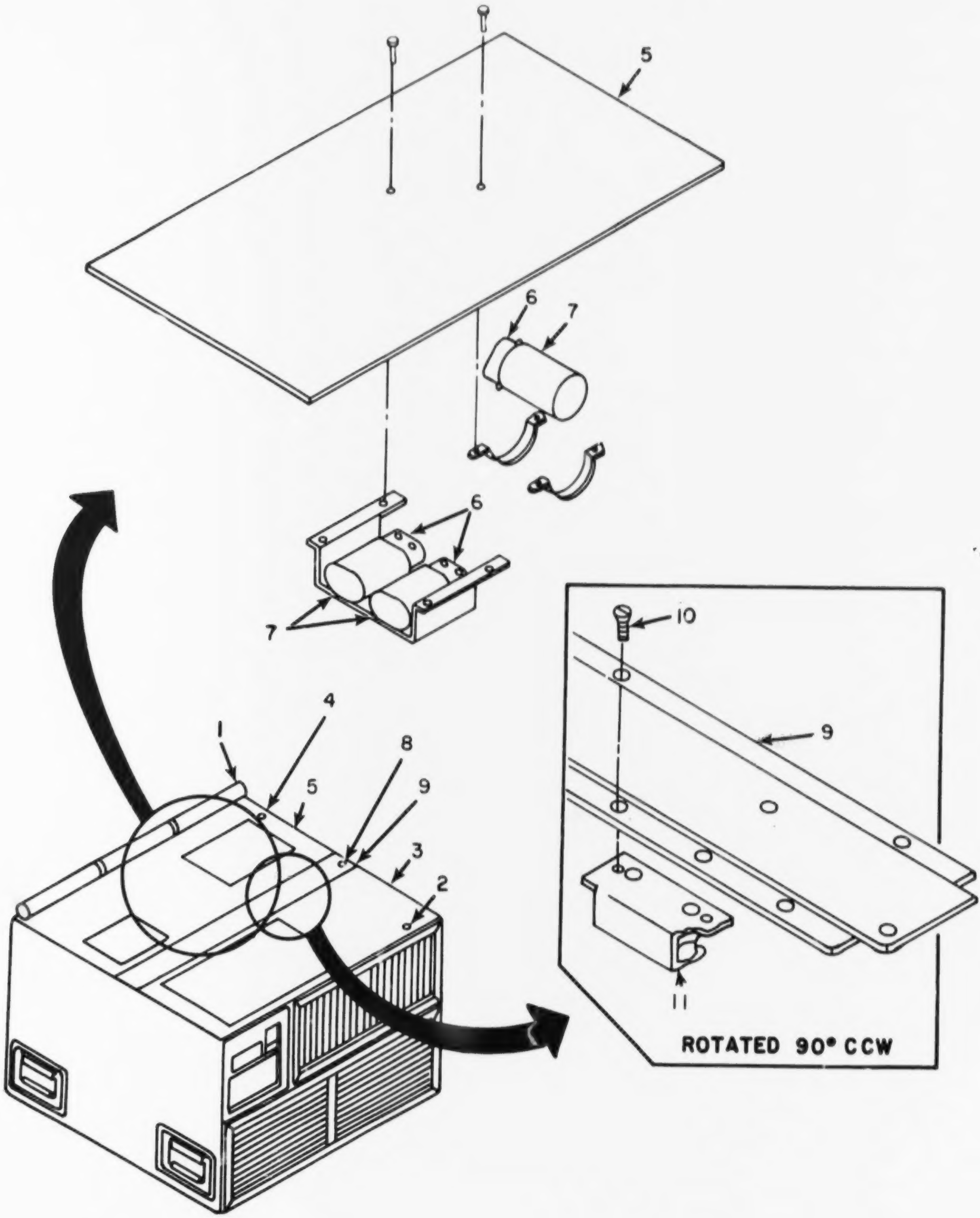
This task covers:

a. Removal
b. Repair
c. Installation

INITIAL SETUP

Materials/Parts
Flexible polyurethane Foam, (Item 20, App. E)
Warm, soapy water
Filter-kote or oil (Item 17, App. E)
Cellular Rubber strips (Item 19, App. E)
Adhesive (Item 18, App. E) - Toluolene (Item 27, App. E)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power input connector before doing maintenance work on electrical system.	
TOP OF HOUSING		
Removal 1. Fabric Cover	a. Loosen ties on canvas cover (1). b. Roll down. c. Remove screws, flat washers, and lockwashers securing canvas cover (1). d. Roll up canvas cover (1). e. Refasten ties around rolled canvas cover (1). f. Set aside.	


ROTATED 90° CCW

5-11. COVERS AND PANELS – Continued

LOCATION/ITEM	ACTION	REMARKS
TOP OF HOUSING (continued)		
Removal 2. Front Top Cover	a. Remove eight screws (2) securing front top cover (3). b. Remove front top cover (3).	
3. Rear Top Cover	a. Remove seven screws (4) securing rear top cover (5). **WARNING** Always ground every capacitor likely to hold a dangerous potential charge. b. Slide rubber boots (6) away from capacitors (7). c. Discharge capacitors (7) using instrument with insulated handle. d. Tag and disconnect leads from capacitors (7). e. Remove rear top cover (5).	
4. Center Top Cover	a. Remove two screws (8) securing center top cover (9). b. Remove two screws (10) holding the thermostatic heater switch bracket (11) to the cover. Leave the switch in place. c. Remove center top cover (9).	
Repair 5. Top Covers	a. Inspect for bent covers, loose, missing gaskets or foam insulation. b. Clean dirty covers with warm, soapy water. c. Straighten or replace damaged covers.	

5-11. COVERS AND PANELS - Continued

LOCATION/ITEM	ACTION	REMARKS
Repair 5. Top Covers (continued)	**WARNING** MMM-A-121 Adhesive is flammable and its vapors can be explosive. Repeated or prolonged skin contact or inhalation of vapors can be toxic. Use in a well ventilated area and keep away from sparks or flame. Use goggles, gloves, and apron when appropriate. d. Secure loose rubber gaskets or insulating foam with adhesive (Item 18, App. E). e. Remove damaged gaskets. **WARNING** Toluolene is flammable and its vapors can be explosive. Repeated or prolonged skin contact or inhalation of vapors can be toxic. Use in a well-ventilated area and keep away from sparks or flame. Use goggles, gloves, and apron when appropriate. f. Clean area using toluolene (Item 27, App. E). **WARNING** MMM-A-121 Adhesive is flammable and its vapors can be explosive. Repeated or prolonged skin contact or inhalation of vapors can be toxic. Use in a well-ventilated area and keep away from sparks or flame. Use goggles, gloves, and apron when appropriate. g. Replace damaged gaskets using cellular rubber strips (Item 19, APP.E).	

5-11. COVERS AND PANELS - Continued

LOCATION/ITEM	ACTION	REMARKS
	WARNING MMM-A-121 Adhesive is flammable and its vapors can be explosive. Repeated or prolonged skin contact or inhalation of vapors can be toxic. Use in a well-ventilated area and keep away from sparks or flame. Use goggles, gloves, and apron when appropriate.	
Repair (Continued) 5. Top Covers-Continued	h. Replace damaged foam insulation with flexible polyurethane foam (Item 20, App. E) and Adhesive (Item 18, App. E).	
6. Canvas Cover	a. Repair any rips in canvas or seams. b. Replace any damaged grommets or snaps. c. Replace cover if heavily damaged.	
Installation 7. Center Top Cover	a. Secure thermostatic heater switch bracket (11) to underside of cover (9) with two screws (10). b. Aline cover (9) and secure with two screws (8).	
7. Rear Top Cover	a. Connect leads to capacitors (7) and remove tags. b. Slide rubber boots (6) over capacitor leads. c. Aline cover (5) and secure with seven screws (4).	
8. Fabric Cover	Aline canvas cover (1) and secure with screws, flat washers, and lockwashers.	
9. Front Top Cover	a. Aline cover (3) and secure with eight screws (2).	

5-12. SCREENS & GUARDS - REPLACE/REPAIR

This task covers:

a. Removal
b. Repair
c. Installation

LOCATION/ITEM — ACTION — REMARKS

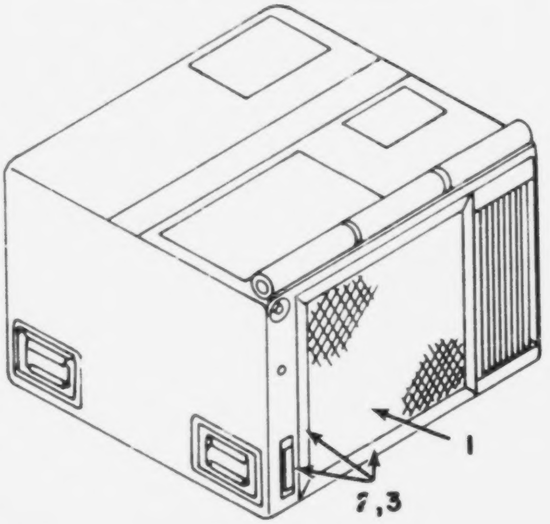
REAR OF HOUSING

WARNING

Disconnect air conditioner power input connector before doing maintenance work on electrical system.

Removal

Remove eight screws (2) and eight lockwashers (3) securing guard (1). Remove guard.



REAR VIEW

Repair

a. Inspect for bent guard.
b. Straighten bent guard, or replace if damaged beyond repair.

Installation

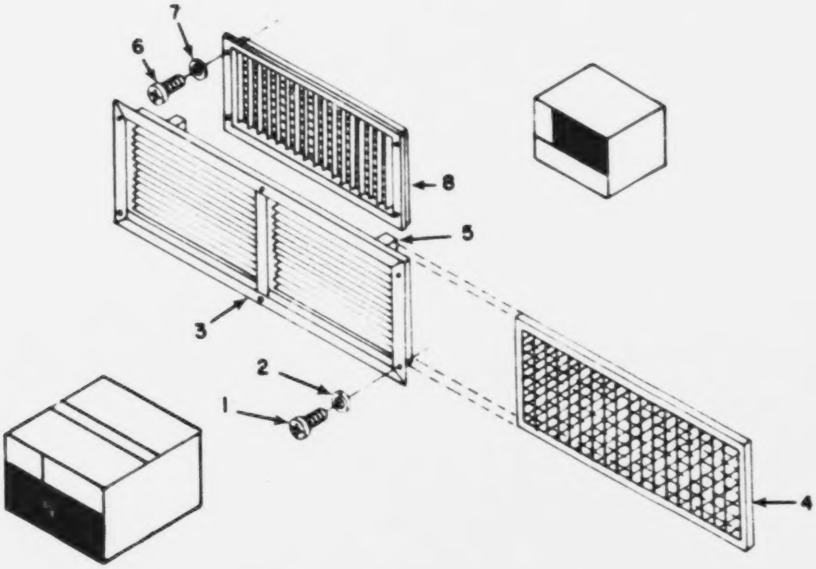
a. Install guard (1) with screws (2) and washers (3).
b. Tighten all screws (2) securing guard (1).

5-13. LOUVERS - REPLACE

This task covers:

a. Removal
b. Installation

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power input connector before doing maintenance work on electrical system.	
Removal 1. Evaporator Inlet Louver	a. Remove eight screws (1) and eight lockwashers (2) securing louver (3) to housing. b. Remove louver (3). c. Remove evaporator air inlet filter (4) from filter clip (5).	
2. Evaporator Outlet Louver	a. Remove six screws (6) and six lockwashers (7) securing louver (8) to housing. b. Remove louver (8).	



5-13. LOUVERS - Continued

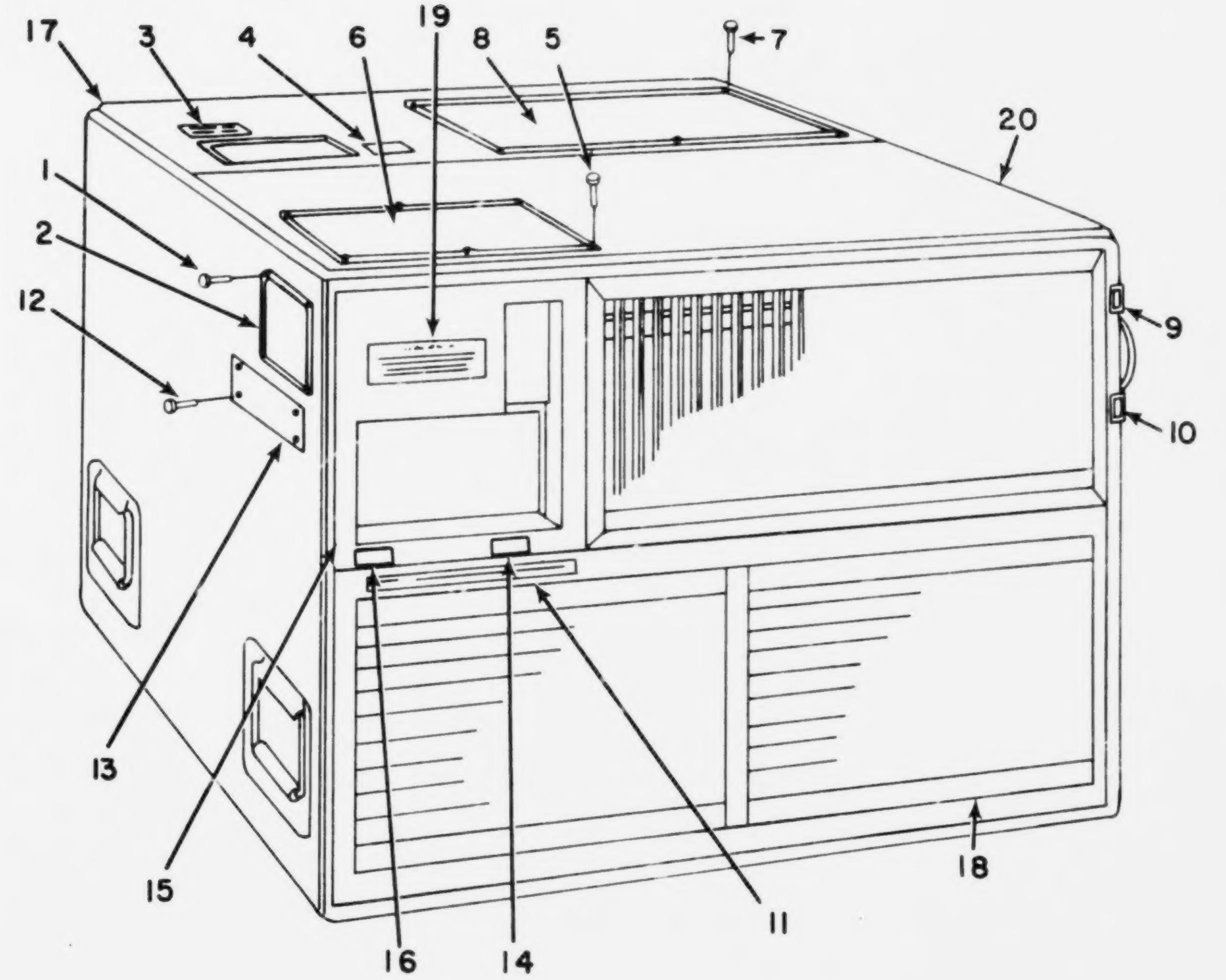
LOCATION/ITEM	ACTION	REMARKS
Installation		
5. Evaporator Outlet Louver	Aline and secure louver (8) to housing using six screws (6) and six lockwashers (7).	
6. Evaporator Inlet Louver	a. Install evaporator inlet air filter (4) into filter clips (5). b. Aline and secure louver (3) to housing using eight screws (1) and eight lockwashers (2).	

5-14. INFORMATION PLATES - REPLACE

This task covers:

a. Removal
b. Installation

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power input connector before doing maintenance work on electrical system.	
Removal		
1. Reset High Pressure Decal	Using a flathead screwdriver, remove high pressure reset decal (14) from junction box (15).	
2. Reset Low Pressure Decal	Using a flathead screwdriver, remove low pressure reset decal (16) from junction box (15).	
3. High Pressure Charging Valve Decal	Using a flathead screwdriver, remove high pressure charging valve decal (4) from rear to cover (17).	
4. Low Pressure Charging Valve Decal	Using a flathead screwdriver, remove low pressure charging valve decal (3) from rear top cover (17).	
5. Caution: LPCO Jumper Decal	Using a flathead screwdriver, remove caution decal (11) from evaporator inlet louver (18).	
6. Caution: Grounding Decal	Using a flathead screwdriver, remove caution decal (19) from front of junction box (15).	
7. Vent Open Decal	Using a flathead screwdriver, remove the vent open decal (9) from right front of air conditioner (above vent damper actuator wheel).	



5-14. INFORMATION PLATES-Continued

LOCATION/ITEM	ACTION	REMARKS
Removal-Continued		
8. Vent Closed Decal	Using a flathead screwdriver, remove the vent closed decal (9) from the right front of the air conditioner (beneath vent damper actuator wheel).	
9. Identification Plate	**WARNING** Disconnect air conditioner power supply before doing maintenance work on or near electrical components or junction box compartment. a. Remove front top cover (20). (See paragraph 4-17). b. Remove junction box (15). (See paragraph 4-25). **CAUTION** When removing or installing Identification Plate be careful not to damage any components in the junction box compartment. c. using a 1/8" diameter drill, remove four rivets (1) from identification plate (2) and housing. d. Remove identification plate (2) from housing.	
10. Danger Plate	**WARNING** Disconnect air conditioner power supply before doing maintenance work on or near electrical components or in junction box compartment. a. Remove front top cover (20). (See paragraph 4-17). b. Remove junction box (15). (See paragraph 4-25).	

5-14. INFORMATION PLATES–Continued

LOCATION/ITEM	ACTION	REMARKS
Removal–Continued 10. Danger Plate–Continued	**CAUTION** When removing or installing Danger Plate, be careful not to damage any components in the junction box compartment.	
	c. Using a 1/8" diameter drill remove four rivets (12) from danger plate (13) and housing. d. Remove danger plate (13) from housing.	
11. Schematic Diagram	a. Remove front top cover (20). (See paragraph 4-17). b. Using a 1/8" diameter drill, remove six rivets (5) from schematic diagram (6) and front top cover (20). c. Remove schematic diagram (6) from front top cover (20).	
12. Refrigeration Diagram	a. Remove rear top cover (17). (See paragraph 4-17). b. Using a 1/8" diameter drill remove six rivets (7) from refrigeration diagram (8) and rear top cover (17). c. Remove refrigeration diagram (8) from rear top cover (17).	
Installation 13. Reset High Pressure Decal	a. Remove protective paper from back of new reset high pressure decal (14) to expose sticky surface. b. Aline reset high pressure decal (14) to proper position on junction box (15) and press in place.	

5-14. INFORMATION PLATES-Continued

LOCATION/ITEM	ACTION	REMARKS
Installation-Continued		
14. Reset Low Pressure Decal	a. Remove protective paper from back of reset low pressure decal (16) and expose sticky surface. b. Aline reset low pressure decal (16) to proper position on junction box (15) and press in place.	
15. High Pressure Charging Valve Decal	a. Remove paper from back of new high pressure charging valve decal (4) to expose sticky surface. b. Aline decal (4) to proper position on rear top cover (17) and press in place.	
16. Low Pressure Charging Valve Decal	a. Remove paper from back of new low pressure charging valve decal (3) to expose sticky surface. b. Aline decal (3) to its proper position on rear top cover (17) and press in place.	
17. Caution: LPCO Jumper Decal	a. Remove paper from back of Caution: LPCO Jumper Decal (11) and expose sticky surface. b. Aline decal (11) to its proper position on evaporator inlet louver (18) and press in place.	
18. Caution: Grounding Decal	a. Remove paper from back of Caution: Grounding Decal (19) and expose sticky surface. b. Aline decal (19) to proper position on junction box (15) and press in place.	
19. Vent Open Decal	a. Remove paper from back of new Vent Open Decal (10) and expose sticky surface. b. Aline decal (10) to proper position on housing (above vent damper actuator wheel) and press in place.	

5-14. INFORMATION PLATES-Continued

LOCATION/ITEM	ACTION	REMARKS
Installation – Continued		
20. Vent Closed Decal	a. Remove paper from back of new Vent Closed Decal (9) and expose sticky surface. b. Aline decal (9) to proper position on housing (beneath vent damper actuator wheel) and press in place.	
21. Identification Plate	**WARNING** Disconnect air conditioner power supply before doing maintenance work on or near electrical components or junction box compartment. a. Aline identification plate (2) onto housing in proper position. **CAUTION** Be careful not to damage internal components of junction box compartment when installing identification plate. b. Secure identification plate (2) to housing using four rivets (1). c. Install junction box (15). (See paragraph 4-25). d. Install Front Top cover (20). (See paragraph 4-17).	
22. Danger Plate	**WARNING** Disconnect air conditioner power supply before doing maintenance work on or near electrical components or junction box compartment. **CAUTION** Be careful not to damage internal components of junction box compartment when installing danger plate.	

5-14. INFORMATION PLATES-Continued

LOCATION/ITEM	ACTION	REMARKS
Installation-Continued 22. Danger Plate-Continued	a. Aline danger plate (13) onto housing in proper position. b. Secure danger plate (13) to housing using four rivets (12). c. Install junction box (15). (See paragraph 4-25). d. Install front top cover (20). (See paragraph 4-17).	
23. Schematic Diagram	a. Aline schematic diagram (6) onto proper position. b. Secure schematic diagram (6) to front top cover (20) with six rivets (5). c. Install front top cover (20). (See paragraph 4-17)	
24. Refrigeration Diagram	a. Aline refrigeration diagram (8) onto rear to cover (17) in proper position. b. Secure refrigeration diagram (8) to rear to cover (17) with six rivets (7). c. Install rear top cover (17) onto air conditioner. (See paragraph 4-17)	

5-15. EVAPORATOR MOTOR - REPAIR

This task covers:

a. Disassembly c. Reassembly
b. Repair

INITIAL SETUP

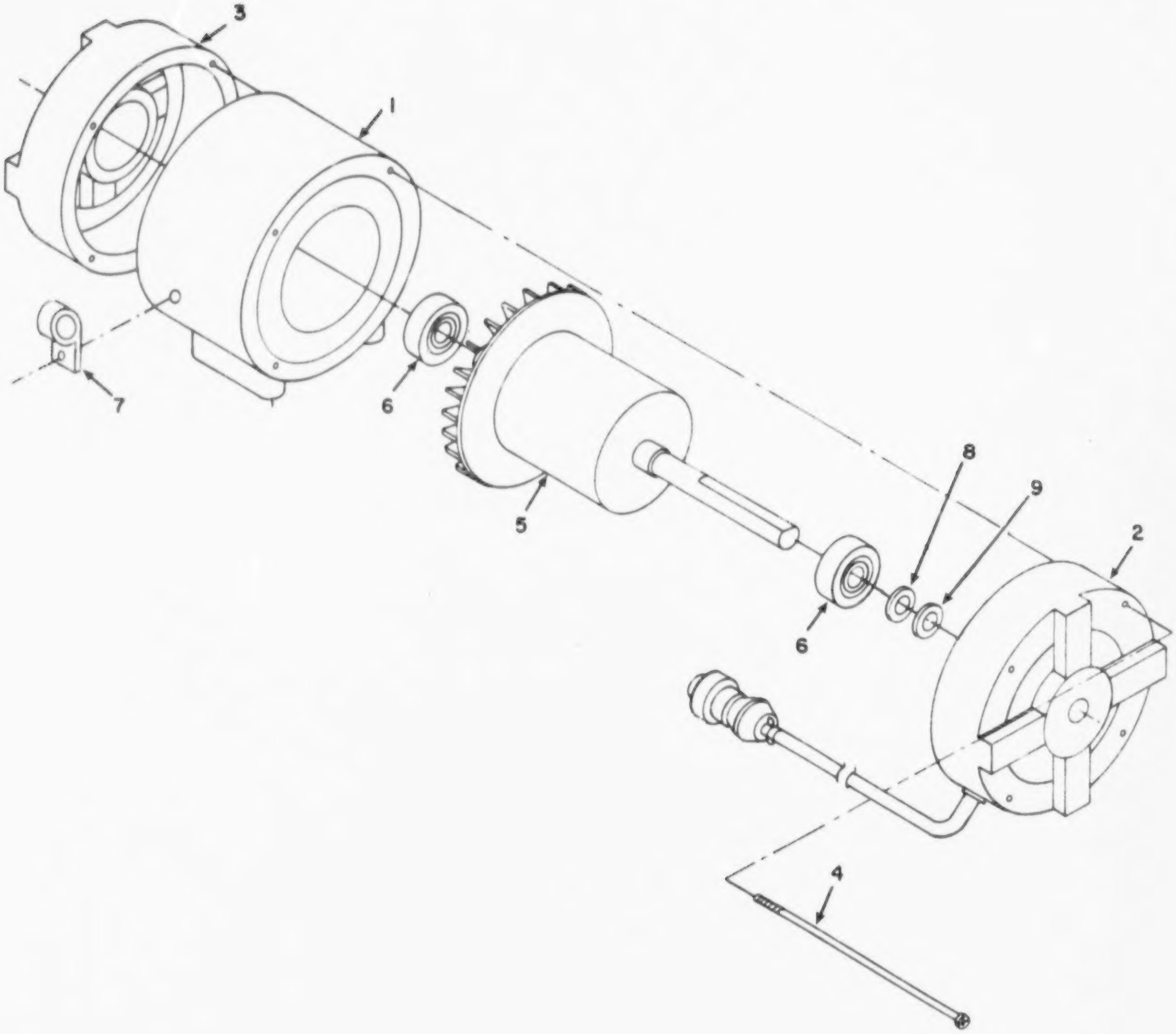
Equipment Condition

Para	Condition Description
4-18	Evaporator Inlet Louver removed.
4-32	Evaporator fan assembly removed.

Special Tools
Plastic bar or rawhide mallet

Materials/Parts
Dry cleaning solvent (App. E, Item 16)
Cloth, lint-free (App. E, Item 9)
Oil (App. E, Item 14)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power supply before doing any maintenance work on the electrical system.	
Disassembly	a. Match-mark the stator (1) and both end-bells (2 and 3) of the motor to ease reassembly. b. Unscrew four tie-bolts (4) and remove from the motor. c. Using a rawhide mallet or plastic bar and hammer, tap the rear end-bell (3) away from the stator (1). Tap opposite sides, top and bottom in an alternating sequence to break the end-bell loose, if necessary.	



5-15. EVAPORATOR MOTOR – Continued

LOCATION/ITEM	ACTION	REMARKS
Disassembly – (Continued)	d. Pull out the rotor (5) and inspect the bearing surfaces for damage. If damaged, replace the bearings (6). Press out or drive out damaged bearings from the end-bell. If their condition is acceptable, proceed with disassembly. e. Unscrew the loop clamp (7) from the side of the stator housing (1). **CAUTION** Remove the front end-bell carefully to avoid damaging wires. Wires may be left in place if care is taken to avoid damaging them. f. Remove the front end-bell (2) from the stator (1), in the same manner as described in step c above. g. Press out or drive out bearings (6) from the end-bell. Retain the shims (8) and spring (9) for use at reassembly if they are in good condition. **WARNING** Dry cleaning solvent (App. E, Item 16) used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F–130°F (38°C–59°C).	

5-15. EVAPORATOR MOTOR - Continued

LOCATION/ITEM	ACTION	REMARKS
Repair	a. Clean inside surfaces of end-bells with solvent and blow dry with compressed air or wipe dry with lint-free cloth. b. Blow dust out of coils in stator with compressed air (30-50 PSI). (2.1 kg/cm^3 to 3.5 kg/cm^2) c. Inspect shaft surfaces of rotor for nicks, gouges and deformation. Dress out high metal with a fine file of stone. If damage exceeds reparable limits, replace motor. d. Inspect cooling fan on rotor for nicks or bends. Dress out nicks with a fine file or stone. Straighten bent vanes or deformed disk. e. Inspect the thrust washer, shims and bearings for wear, tearing or other damage. Replace if worn or damaged. f. Inspect the wire connections to stator coils for cuts, abrasions or loose connections. Repair or replace as required. g. Replace bolts if worn or damaged. h. Inspect connector and replace if necessary.	
Reassembly	a. Coat the shaft surfaces of the rotor (5) with oil; then slide bearings (6) over end of shaft so they seat against shoulder at inner end of bearing diameter of shaft. Press or drive bearings onto shoulders. b. Dip a spring (9) and shims (8) in oil and slide over each end of shaft with spring next to bearings.	

5-15. EVAPORATOR MOTOR - Continued

LOCATION/ITEM	ACTION	REMARKS
Reassembly-Continued		
	NOTE: Bearings are lubricated at time of manufacture and require no further lubrication before they are installed.	
	c. Coat the bearing cavity of the end-bells with oil.	
	d. Slide bearing cavity fully into position over shaft so that the outer diameter of bearing (6) enters inner diameter of bearing cavity in end-bells.	
	e. Insert rotor (5) into stator and housing.	
	f. Install end-bells (2 and 3).	
	g. Install tiebolts to secure end-bells (2 and 3) to housing (1).	
	h. Install loop clamp (7) to side of stator housing.	
	i. Install motor into housing.	See paragraph 4-33.

5-16. CONDENSER FAN MOTOR - REPAIR

This task covers:

a. Disassembly
b. Cleaning and Inspection
c. Reassembly

INITIAL SETUP
Equipment
Condition

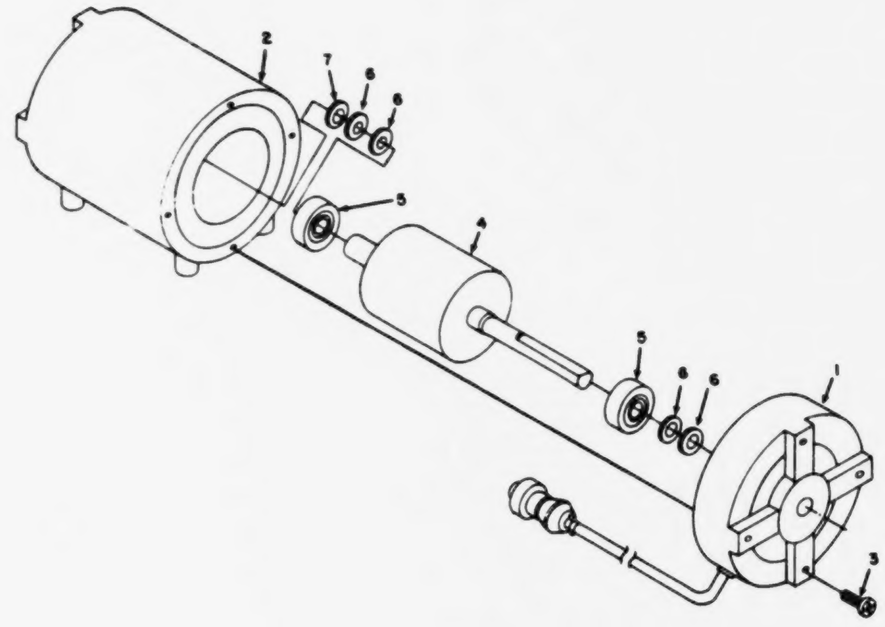
Para	Condtion Description
4-17	Rear Top Cover removed.
4-36	Condenser Fan Motor removed.

Special Tools
Plastic bar or rawhide mallet

Materials/Parts
Dry cleaning solvent (App. E, Item 16)
Cloth, Line free (App. E, Item 9)
Oil (App. E, Item 14)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power supply before doing any maintenance work on the electrical system.	
Disassembly	a. Match-mark the end plate (1) and motor housing (2) to ease reassembly. b. Remove screws (3) from the end plate (1) on motor. c. Remove plastic nut from end plate (1) on wiring.	
	CAUTION Remove the rear end plate carefully to avoid damaging wires. Wires may be left in place if care is taken to avoid damaging them.	

5-16. CONDENSER FAN MOTOR - Continued

LOCATION/ITEM	ACTION	REMARKS
		
	d. Using a rawhide mallet or plastic bar and hammer, tap the rear end plate (1) away from housing (2). Use caution not to damage wiring.	
	e. Pull out the rotor (4), with bearings (5) from end plate (1).	
	f. Remove bearings (5) from rotor (4). Retain the shims (6) and spring (7) for use at reassembly if they are in good condition.	

5–16. CONDENSER FAN MOTOR – Continued

LOCATION/ITEM	ACTION	REMARKS
Disassembly–Continued	**WARNING** Dry cleaning solvent (App. E., Item 16) used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F. (38°C–59°C)	
Repair	a. Clean inside surfaces of end plate and housing with solvent, blow dry with compressed air or wipe dry with lint-free cloth. b. Blow dust out of coils in stator with compressed air (30–50 PSI). (2.1 kg/cm^3 to 3.5 kg/cm^2) c. Inspect shaft surfaces of rotor for nicks, gouges and deformation. Dress out high metal with a fine file or stone. If damage exceeds reparable limits, replace motor. d. Inspect the thrust washer and shims for wear, tearing or other damage. Replace if worn or damaged. e. Inspect the wire connections to stator coils for cuts, abrasion or loose connections. Repair or replace as required.	
Reassembly	a. Coat the shaft surfaces of the rotor (4) with oil; then slide bearings (5) over end of shaft so they seat against shoulder at inner end of bearing diameter of shaft. Press or drive bearings (5) onto shoulders. b. Dip a spring (7) and shims (6) in oil and slide over each end of shaft with spring next to bearings.	

5-16. CONDENSER FAN MOTOR – Continued

LOCATION/ITEM	ACTION	REMARKS
Reassembly – (Continued)	NOTE: Bearings are lubricated at time of manufacture and require no further lubrication before they are installed.	
	c. Coat the bearing cavity of the housing (2) and end plate (1) with oil.	
	d. Insert rotor (4) into stator and housing (2).	
	e. Install end plate (1).	
	f. Install four screws to secure end plate (1) to stator and housing (2).	
	g. Install and tighten plastic nut on wiring to end plate (1).	

5-17. EVAPORATOR COIL - REPLACE/REPAIR

This task covers:

a. Removal b. Installation

INITIAL SETUP

Equipment Condition

Para	Condition Description
4-17	Top Covers removed.
4-18	Evaporator Outlet Louver removed.
5-4	System refrigerant discharged.
4-20	Mist eliminator removed.

Test Equipment

Halogen Leak Detector

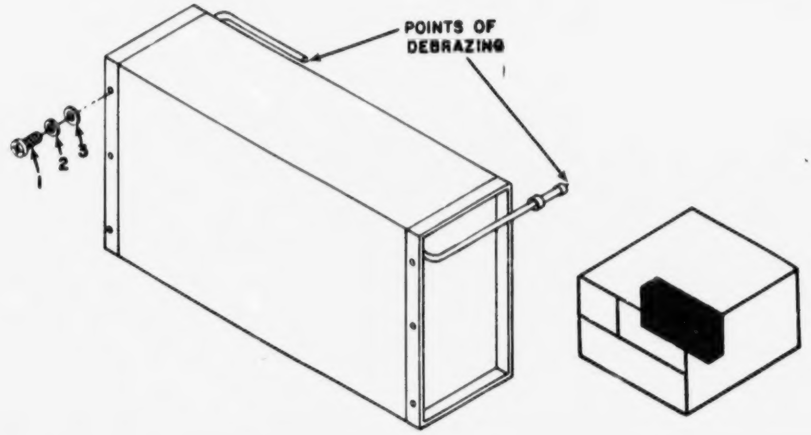
Materials/Parts

Dry cleaning solvent (P-D 680) (App.E, Item 16)
Nitrogen (App.E, Item 5 or 6)
Brazing Alloy (App.E, Item 5 or 6)
Brazing Flux (App.E, Item 7)
Warm, soapy water
Brush, wire
Cloth, line free (App.E, Item 9)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Purge system with dry nitrogen prior to soldering; refrigerant heated by flame or hot surfaces creates phosgene gas, a highly toxic gas. **WARNING** Do not let refrigerant touch you or inhale refrigerant gas. Be especially careful to prevent refrigerant from coming in contact with your eyes. In case of refrigerant leaks, ventilate area at once.	

5-17. EVAPORATOR COIL - Continued

LOCATION/ITEM	ACTION	REMARKS
	WARNING Check that power source is disconnected.	
	WARNING Follow general debrazing instructions given in paragraph 5-12. Provide a flow of dry nitrogen through the refrigeration system while debrazing connections.	
	WARNING The polyurethane foam used as insulation in the air conditioner will break down to form toxic gasses if exposed to the flame of a torch at brazing temperature.	
Removal	a. Remove six screws (1), six lockwashers (2), and six flat washers (3) securing evaporator coil to housing.	
	b. Debraze tubing from evaporator coil.	
	c. Carefully lift the evaporator coil from the air conditioner.	
	d. Remove dehydrator.	See para. 5-26.



5-17. EVAPORATOR COIL - Continued

LOCATION/ITEM	ACTION	REMARKS
Inspection	Inspect the evaporator coil for bent or torn fins and for damaged connections.	
Cleaning	**WARNING** Dry cleaning solvent (App.E, Item 16) used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F (38°C). Clean coil using cleaning solvent (App.E, Item 16) and soft brush.	
Installation	a. Connect tubing to coil. Before brazing joints, provide a flow of dry nitrogen through refrigeration system to protect internal surfaces of the tubing and fittings.	See para. 5-5.
	b. Place coil in air conditioner, and secure coil to housing with six screws (1), six lockwashers (2) and six flat washers (3).	
	c. Install new dehydrator.	See Para. 5-26.
	d. Leak test system.	See Para. 5-7.
	e. Evacuate system	See Para. 5-8.
	f. Charge system	See Para. 5-9.
	g. Install evaporator outlet louver.	See Para. 4-18.
	h. Install mist eliminator.	See Para. 4-20.
	j. Install top Covers.	See Para. 4-17.

5-18. EXPANSION VALVES - REPLACE

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Equipment Condition Para	Condition Description
4-17	Front and Center Top Covers removed.
4-38	Solenoid Valve Coil (L1) removed.
5-4	Discharge refrigerant.

Materials/Parts
- Nitrogen (App.E, Item 4)
- Brazing Solder (App.E, Item 5 & 6)
- Brazing Flux (App.E, Item 7)
- Hot Water
- Cloth, lint free (App.E, Item 9)

Test Equipment
- Halogen Leak Detector

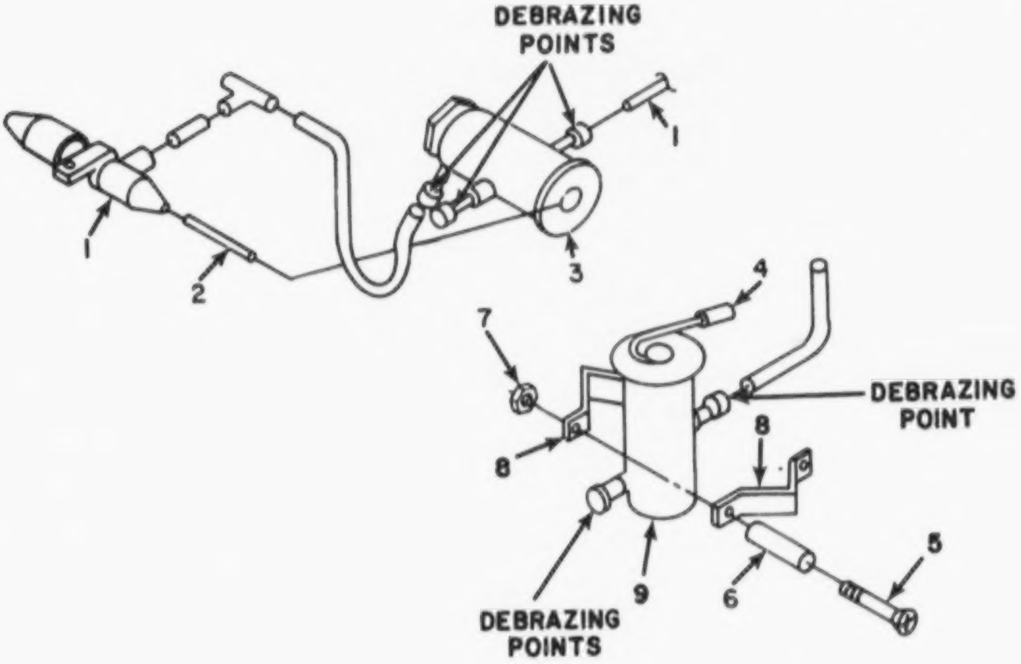
LOCATION/ITEM	ACTION	REMARKS

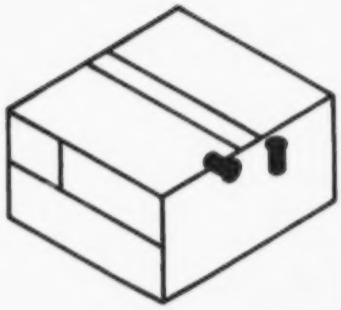
WARNING

The burning of polyurethane foams is dangerous. Due to the chemical composition of a polyurethane foam, toxic fumes are released when it is burned or heated. If it is burned or heated indoors, such as during a welding operation in its proximity, precautions should be taken to adequately ventilate the area. An exhaust system equivalent to that of a spray paint booth should be used. Air supply respirators, approved by the National Institute for Occupational Safety and Health or the U.S. Bureau of Mines should be used for all welding in confined spaces, and when ventilation is inadequate.

5-18. EXPANSION VALVES - Continued

LOCATION/ITEM	ACTION	REMARKS
	WARNING Individuals who have chronic or recurrent respiratory conditions, including allergies and asthma, should not be employed in this environment. **WARNING** Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas. Be especially careful that refrigerant does not come in contact with eyes. In case of refrigerant leaks., ventilate area immediately. **WARNING** Check that power source is disconnected. Check that system is discharged of refrigerant. **WARNING** When performing brazing/debrazing operations, wrap valves with wet rags to act as a heat sink. NOTE Replace dehydrator whenever refrigerant system is opened.	
Removal 1. Primary Expansion Valve	a. Soften mastic in bulb well (1) if necessary, by warming with a cloth soaked in hot water and wrung out, a heat lamp, or equivalent. b. Withdraw bulb (2) from well taking care to prevent damage to capillary tube.	


DEBRAZING POINTS
1
1
2
3
4
7
DEBRAZING POINT
8
8
9
6
5
DEBRAZING POINTS



5–18. EXPANSION VALVES – Continued

LOCATION/ITEM	ACTION	REMARKS
Removal– (Continued) 1. Primary Expansion Valve–(Continued)	c. With dry nitrogen flowing through refrigerant system, debraze tubing to valve at debrazing point.	See Para. 5–5 and 5–6.
	d. Remove expansion valve (3) from unit.	
2. Quench Expansion Valve	a. Soften mastic bulb well if necessary, by warming with a cloth soaked in hot water.	
	b. Withdraw the bulb (4) from the well. Take care to prevent damage to the capillary tube.	
	c. Remove two screws (5), two spacers (6), two self locking nuts (7), and two valve mounting brackets (8).	
	d. Debraze tubing from valve (9) at debrazing points.	See Para. 5–5 and 5–6.
	e. Remove quench valve (9).	
Installation 3. Primary Expansion Valve	a. With dry nitrogen flowing through refrigeration system, braze valve to tubing. **CAUTION** Take care to avoid kinking capillary tube.	
	b. Coil excess tubing.	
	c. Insert approximately 1.0 ounce (28.349 gms) of thermal mastic in bulb well (1).	

5-18. EXPANSION VALVES - Continued

LOCATICN/ITEM	ACTION	REMARKS
Installation-Continued		
3. Primary Expansion Valve-(Continued)	d. Press sensing bulb (2) into well (1) and work back and forth to distribute mastic thoroughly and until capillary end is approximately 1.0 inch (2.54 cm) beyond open end of well.	
	e. Replace dehydrator.	See Para. 5-26
	f. Leak test refrigeration system.	See Para. 5-7.
	g. Evacuate refrigeration system.	See Para. 5-8.
	h. Charge refrigeration system.	See Para. 5-9.
	i. Install Front and Center Top Covers.	See Para. 4-17.
4. Quench Expansion Valve	a. With dry nitrogen flowing through refrigerant system, braze valve to tubing.	See Para. 5-5 and 5-6.
	CAUTION Take care to avoid kinking capillary tube.	
	b. Coil excess tubing.	
	c. Insert approximately 1.0 ounces (28.349 gms) of thermal mastic in bulb well.	
	d. Press sensing bulb (10) into well and work back and forth to distribute mastic thoroughly and until capillary end is approximately 1.0 inch (2.54 cm) beyond open end of well.	
	e. Install two valve mounting brackets (8) to housing using two screws (5), two spacers (6) and two locknuts (7).	
	f. Replace dehydrator.	See Para. 5-26
	g. Leak test refrigeration system.	See Para. 5-7.
	h. Evacuate refrigeration system.	See Para. 5-8.
	i. Charge refrigeration system.	See Para. 5-9.
	j. Install Rear Top Cover.	See Para. 4-17.

5-19. SOLENOID VALVES - REPLACE

This task covers:

a. Removal b. Installation

INITIAL SETUP

Equipment Condition Para	Condition Description
4-17	Rear top cover removed.
5-4	Refrigerant system discharged.

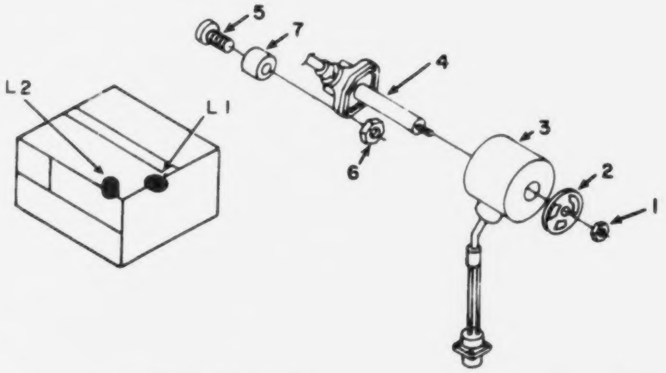
Materials/Parts

Solder, Brazing (App.E, Item 5 & 6)
Flux, Soldering (App.E, Item 7)

LOCATION/ITEM	ACTION	REMARKS
TOP OF HOUSING	**WARNING** Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas. Be especially careful that refrigerant does not come in contact with eyes. In case of refrigerant leaks, ventilate area immediately. **WARNING** Check that power source is disconnected. **WARNING** Check that system is discharged of refrigerant. **CAUTION** When performing brazing/debrazing operations, wrap valves with wet rags to act as a heat sink.	

5-19. SOLENOID VALVES - Continued

LOCATION/ITEM	ACTION	REMARKS
Removal 1. Solenoid L2		
	a. Disconnect electrical connector from bulkhead.	
	b. Remove plunger nut (1) and name-plate (2) from plunger (4) and remove coil (3).	
	c. Purge system.	See Para. 5-5.
	d. Debraze and remove valve.	See Para. 5-6.
2. Solenoid L1		
	a. Disconnect electrical connector of solenoid coil from bulkhead.	
	b. Remove plunger nut (1) and name-plate (2) from plunger (4) and remove coil (3).	
	c. Remove two screws (5) two nuts (6) and two spacers (7) securing the valve body to the housing.	
	d. Purge system.	See Para. 5-5.
	e. Debraze and remove valve.	See Para. 5-6.



LOCATION/ITEM	ACTION	REMARKS
Installation 3. Solenoid L2	a. Purge System	See Para. 5-5.
	b. Braze valve body on	See Para. 5-6.
	c. Install coil and secure to plunger with plunger nut (1).	
	d. Connect electrical leads.	See Para. 5-26.
	e. Replace dehydrator.	See Para. 5-7.
	f. Leak test refrigeration system.	See Para. 5-8.
	g. Evacuate refrigeration system.	See Para. 5-9.
	h. Charge refrigeration system.	See Para. 4-17.
	i. Install Rear Top Cover.	

5-19. SOLENOID VALVES - Continued

LOCATION/ITEM	ACTION	REMARKS
Installation-Continued 4. Solenoid L1		
	a. Solder valve body on tubing.	
	b. Secure body to housing with two screws (5), two nuts (6), and two spacers (7) securing the valve body to the housing. Install from outside of housing into valve body.	
	c. Connect electrical connector of solenoid coil to bulkhead.	
	d. Replace dehydrator.	See Para. 5-26.
	e. Leak test refrigeration system.	See Para. 5-7.
	f. Evacuate refrigeration system.	See Para. 5-8.
	g. Charge refrigeration system.	See Para. 5-9.
	h. Install Rear Top Cover.	See Para. 4-17.

5-20. PRESSURE REGULATOR VALVE - REPLACE

This task covers:

a. Removal
b. Installation

INITIAL SETUP

Equipment Condition

Para	Condition Description
4-17	Top Rear and Center Covers removed.
5-4	Refrigerant system discharged.
5-21	Condenser louver actuating cylinder removed.
5-19	Solenoid Valve Coil (L1) removed.

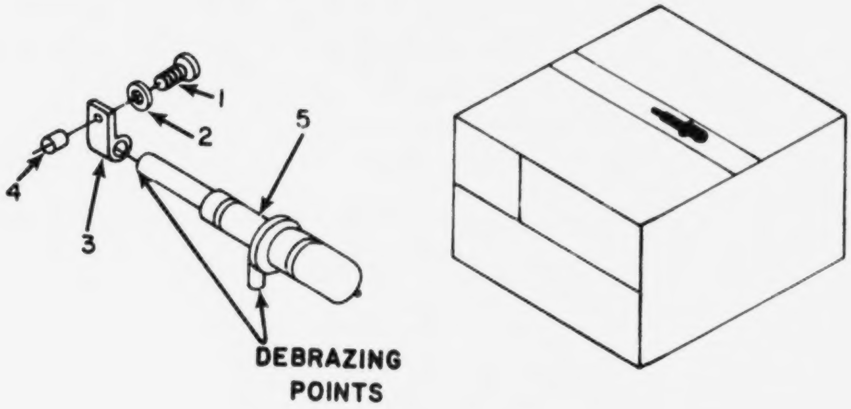
Materials/Parts

Nitrogen
Brazing Solder (App.E, Item 5 & 6)
Brazing Flux (App.E, Item 7)

LOCATION/ITEM	ACTION	REMARKS
TOP OF HOUSING	**WARNING** Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas. Be especially careful that refrigerant does not come in contact with eyes. In case of refrigerant leaks, ventilate area immediately. **WARNING** Check that power source is disconnected. Check that system is discharged of refrigerant.	
Removal		
	a. Purge system by initiating a flow of dry nitrogen through the refrigerant system.	See Para. 5-5.
	b. Debraze the tubing connections as illustrated to the pressure regulator valve.	See Para. 5-6.

5-20. PRESSURE REGULATOR VALVE - Continued

LOCATION/ITEM	ACTION	REMARKS
Removal-Continued	c. Remove screw (1), flat washer (2), clamp (3), and spacer (4) holding valve (5).	
	d. Remove valve (5).	
Installation	a. Replace dehydrator	See para. 5-26.
	b. Connect tubing to valve and braze connections.	See para. 5-6.
	c. Fasten clamp (3) to housing wall and valve (5) using screw (1), lock-washer (2), and post spacer (4).	
	d. Install Solenoid coil (L1).	See Para. 5-19.
	e. Leak test refrigerant system.	See Para. 5-7.
	f. Evacuate refrigerant system.	See Para. 5-8.
	g. Charge refrigerant system.	See Para. 5-9.
	h. Install Rear and Center Top Covers.	See Para. 4-17.



5-21. ACTUATING CYLINDER - INSPECT/ADJUST/REPLACE

This task covers:

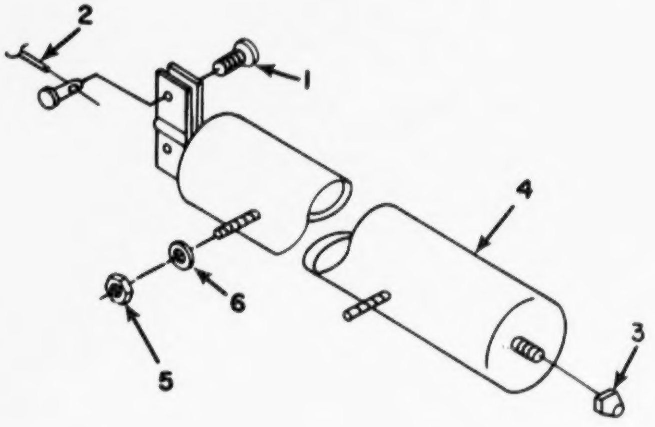
a.	Inspect	c.	Install
b.	Removal	d.	Adjustment

INITIAL SETUP
Equipment
Condition

Para	Condition Description
4-17	Rear and Center Top Covers removed.
5-4	Refrigerant System discharged.
5-19	Solenoid Coil (L1) removed.

LOCATION/ITEM	ACTION	REMARKS
TOP OF HOUSING	**WARNING** Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas. Be especially careful that refrigerant does not come in contact with eyes. In case of refrigerant leaks, ventilate area immediately. **WARNING** Check that power source is disconnected. Check that system is discharged of refrigerant.	
Inspect	Check for visible damage to cylinder and actuating wire.	
Removal	a. Loosen mechanical post screw (1) to loosen control wire in flexible cable (2). Straighten control wire. b. Disconnect flare nut (3) from end of actuating cylinder (4). c. Remove two nuts (5) and two flat washers (6) from evaporator side of partition and remove actuating cylinder (4).	

5-21. ACTUATING CYLINDER - Continued

LOCATION/ITEM	ACTION	REMARKS
		
Installation	a. Install actuating cylinder (4) with studs through openings in partition. Install two flat washers (6) and two nuts (5) on studs.	
	b. Connect the flare nut (3).	
	c. Insert wire ends (2) into the opening in mechanical post of actuating cylinder.	
Adjustment	a. Extend actuator rod until there is a 1/4 inch (.635 centimeters) space between inner edge of mechanical post bracket and the face of the cylinder. Tighten the screw (1) on the mechanical post.	
	b. Replace dehydrator.	See Para. 5-26.
	c. Leak test refrigeration system.	See Para. 5-7.
	d. Evacuate refrigeration system.	See Para. 5-8.
	e. Charge refrigeration system.	See Para. 5-9.
	f. Install Top Rear and Center Covers.	See Para. 4-17.

5-22. PRESSURE SWITCHES - INSPECT/TEST/REPLACE

This task covers:

a. Inspect
b. Removal
c. Test
d. Installation

INITIAL SETUP

Equipment Condition

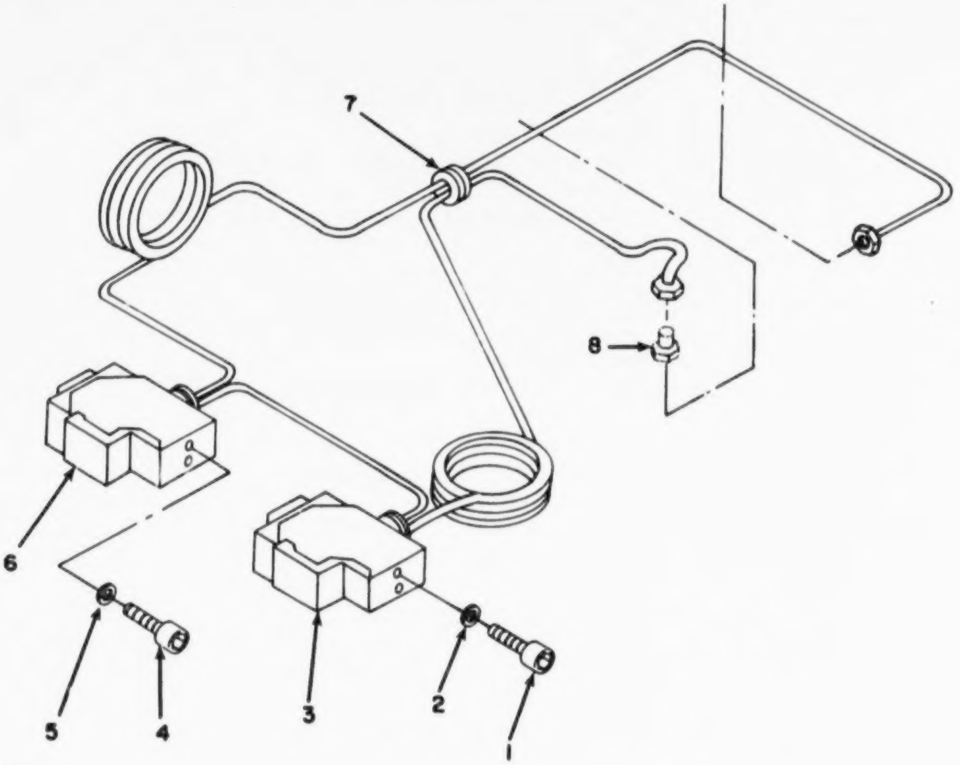
Para	Condition Description
4-17	Front Top Cover removed.
4-20	Mist eliminator and bracket removed.
4-25	Junction Box removed.
5-4	Refrigerant system discharged.

Test Equipment
Multimeter or Continuity Tester
Halogen Leak Detector

Materials/Parts
Nitrogen (App.E, Item 4)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Check that power source is disconnected before doing any maintenance on the air conditioner. Check that refrigerant system is discharged of refrigerant.	
FRONT OF HOUSING		
Inspect	Check wiring and sensing tube for damage.	
Removal	a. Remove two mounting screws (1 and 4) and two lockwashers (2 and 5) from each switch (3 and 6). b. Unhook the electrical leads from the pressure switches. Tag leads for identification at assembly.	

5–22. PRESSURE SWITCHES – Continued



LOCATION/ITEM	ACTION	REMARKS
Removal–Continued	c. Unscrew flare nuts from capillary tube connections (8). Remove grommet (7) from partition and carefully pull capillary tubes through partition. d. Remove pressure switches (3 and 6).	
Test (Electrical)	a. Test for continuity across terminals of switch. If no continuity exists, press the reset button and retest. b. If the switch exhibits continuity, switch may be good. c. If the switch does not indicate continuity, replace.	

5-22. PRESSURE SWITCHES - Continued

LOCATION/ITEM	ACTION	REMARKS
Test-Continued (Pressure)	d. Using nitrogen, pressurize low pressure cutout switch (10-20 PSIG range/.35-.69 kg/cm^2 range).	
	e. Check for discontinuity across terminals.	
	f. If continuity doesn't exists, replace defective switch.	
	g. Using nitrogen, pressurizing high pressure cutout switch (470-490 PSIG range/16.3-17.0 kg/cm^2 range).	
	h. Check for discontinuity across terminals.	
	i. If continuity doesn't exists, replace defective pressure switch.	
Installation		
	a. Insert ends of capillary tubes through hole in partition, being careful to avoid kinking tubes.	
	b. Install grommet (7) in the partition by sliding it over both capillary tubes.	
	c. Connect capillary tube flare nuts (8) to fittings.	
	d. Install switches (3 and 6) and secure with two screws (1 and 4) and two lockwashers (2 and 5). Keep excess capillary tubing coiled neatly without kinks.	
	e. Connect electrical leads and remove tags.	
	f. Install mist eliminator bracket.	
	g. Replace dehydrator.	See Para. 5-26.
	h. Leak test refrigerant system.	See Para. 5-7.
	i. Evacuate refrigerant system.	See Para. 5-8.
	j Charge system.	See Para. 5-9.
	k. Install Junction Box.	See Para. 4-25.
	l. Install mist eliminator.	See Para. 4-20.
	m. Install Evaporator Inlet Louver.	See Para. 4-18.
	n. Install Top Covers.	See Para. 4-17.

5-23. SERVICE VALVES – INSPECT/REPLACE

This task covers:

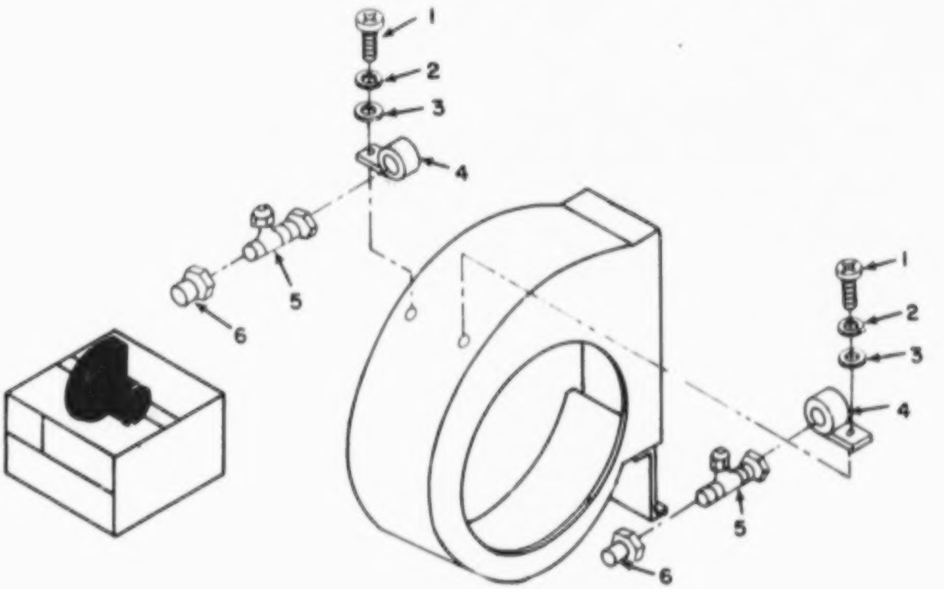
- a. Inspection
- b. Removal
- c. Installation

INITIAL SETUP

Equipment Condition Para	Condition Description
4-17	Rear Cover removed.
5-4	Refrigerant system discharged.

LOCATION/ITEM	ACTION	REMARKS
INTERIOR OF HOUSING	**WARNING** Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas. Be especially careful that refrigerant does not come in contact with eyes. In case or refrigerant leaks, ventilate area immediately. **WARNING** Check power source is disconnected. Check that system is discharged of refrigerant.	
Inspection	a. Visually inspect all valves for signs of damage. b. Inspect valve fittings for leaks.	
Removal	a. Remove screw (1), lockwasher (2), flat washer (3), and clamp (4) from each service valve (5). b. Unscrew and remove flare nuts (6) from suction and discharge service valves. c. Remove refrigeration lines from valves. d. Remove suction and discharge service valves.	

5-23. SERVICE VALVES – Continued



NOTE

In almost every case, a defective service valve will require replacement.

LOCATION/ITEM		ACTION	REMARKS
Installation	a.	Connect suction and discharge service valves (5) to refrigerant piping.	
	b.	Tighten flare nuts (6) at suction and discharge service valves.	
	c.	Secure suction and discharge service valves to condenser scroll with screws (1), lock washers (2), flat washers (3) and clamps (4).	
	d.	Replace dehydrator.	See Para. 5-26.
	e.	Leak test refrigeration system.	See Para. 5-7.
	f.	Evacuate refrigeration system.	See Para. 5-8.
	g.	Charge refrigeration system.	See Para. 5-9.
	h.	Install Rear Top Cover.	See Para. 4-17.

5-24. PRESSURE RELIEF VALVE - INSPECT/REPLACE

This task covers:

- a. Inspect
- b. Removal
- c. Installation

INITIAL SETUP

Equipment Condition

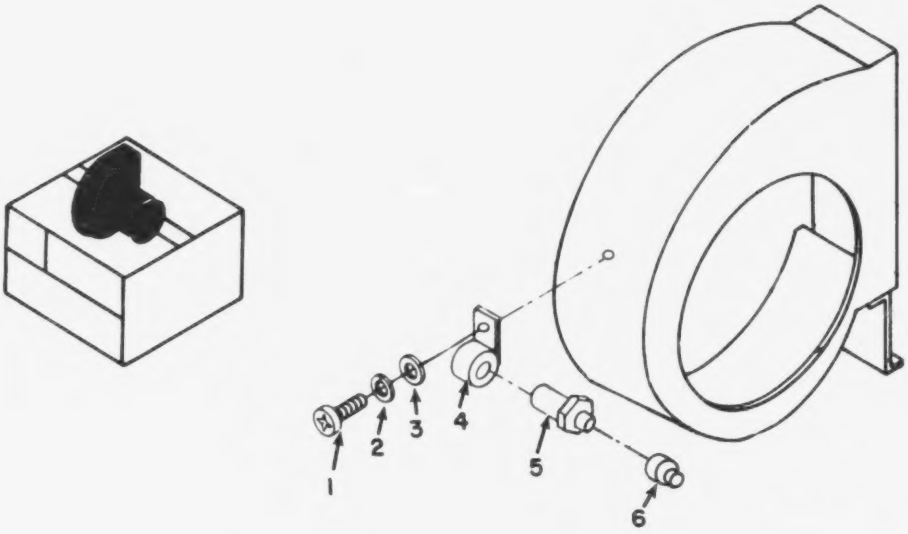
Para	Condition Description
4-17	Rear Top Cover removed.
5-4	Refrigerant system discharged.

LOCATION/ITEM	ACTION	REMARKS
TOP OF HOUSING	**WARNING** Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas. Be especially careful that refrigerant does not come in contact with eyes. In case of refrigerant leaks, ventilate area immediately. **WARNING** Check that power source is disconnected. Check that system is discharged of refrigerant.	
Inspect	Check valve and attaching hardware for damage.	
Removal	a. Remove screw (1), lockwasher (2), flat washer (3) and clamp (4). b. Unscrew valve (5) from adapter (6).	

5-24. PRESSURE RELIEF VALVE – Continued

LOCATION/ITEM	ACTION	REMARKS
Installation	a. Install pressure relief valve (5) in adapter (6). Install loop clamp (4) on valve (5) and secure clamp with screw (1), lockwasher (2), and flat washer (3).	
	b. Replace dehydrator.	See Para. 5-26.
	c. Leak test refrigeration system.	See Para. 5-7.
	d. Evacuate refrigeration system.	See Para. 5-8.
	e. Charge refrigeration system.	See Para. 5-9.
	f. Install Rear Top Cover. See Para. 4-17.	

Fig 5-18



5-25. CONDENSER COIL - REPLACE

This task covers:

a. Removal b. Installation

INITIAL SETUP

Equipment Condition

Para	Condition Description
5-4	Condenser guard removed.
4-17	Top Rear Cover removed.
5-4	Discharge refrigerant system.

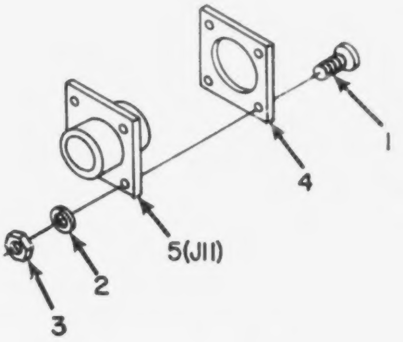
Test Equipment

Halogen Leak Detector

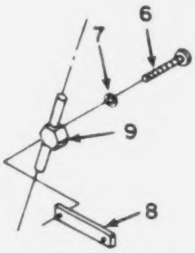
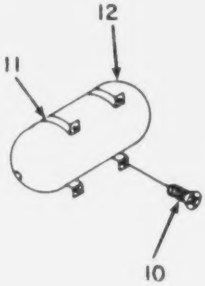
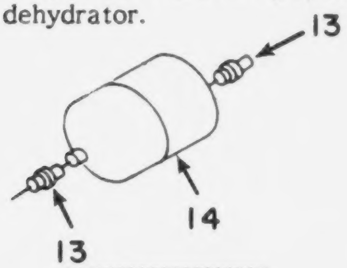
Materials/Parts

Dry Cleaning Solvent (App.E, Item 16)
Cloth, lint free (App.E, Item 9)
Oil (App.E, Item 14)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Ensure power source is disconnected. Ensure refrigerant system is discharged.	
Removal	a. Remove four screws (1), four lockwashers (2), four nuts (3), and gasket (4) attaching auxiliary power input receptacle J11 (5) to housing.	



5-25. CONDENSER COIL - Continued

LOCATION/ITEM	ACTION	REMARKS
Removal- (Continued)	b. Move auxiliary power receptacle (5) J-11 and wiring to aid in condenser coil removal.	
	c. Remove two screws (6), two lockwashers (7), and mounting plate (8) attaching liquid sight indicator (9) to housing.	See Para. 5-27.
	d. Remove four screws (10) and two mounting clamps (11) attaching receiver tank (12) to housing.	
	 	
	e. Purge system.	See Para. 5-5.
	f. Reposition electrical wiring away from piping area to be debrazed.	
	g. Debraze condenser inlet tube tee.	See Para. 5-6.
	h. Disconnect flare nut (13) on dehydrator.	
		
	CAUTION Use extreme care in removing condenser coil from housing to avoid damaging fins and coil piping.	

5-25. CONDENSER COIL - Continued

LOCATION/ITEM	ACTION	REMARKS
Removal-(Continued)	i. Remove condenser coil from unit.	
	j. Debraze receiver tank (12) and liquid sight indicator (9) from condenser coil.	See Para. 5-6.
Installation	a. Braze the receiver tank (12) and liquid sight indicator (9) onto the condenser coil.	See Para. 5-6.
	CAUTION Use extreme care in installing condenser coil assembly into housing to avoid damaging fins, coil, piping and refrigerant system tubing.	
	b. Install condenser coil assembly into air conditioner.	
	c. Purge system.	See Para. 5-5.
	d. Braze condenser inlet tube into tee.	See Para. 5-6.
	e. Replace dehydrator (14) and connect flare nuts (13).	See Para. 5-26.
	f. Install condenser guard with screws and lockwashers	See Para. 5-12.
	g. Install dehydrator and liquid sight indicator. Install receiver using four screws (10) and two mounting clamps (11).	See Para. 5-26. See Para. 5-27.
	h. Leak test refrigeration system.	See Para. 5-7.
	i. Reposition electrical wiring to original position and tie as required.	
	j. Install auxiliary power receptacle J11 (5) and wiring and secure to housing using four screws (1), four lockwashers (2), and four nuts (3).	
	k. Install Rear Top Cover.	See Para. 4-17.
	l. Evacuate refrigeration system.	See Para. 5-8.
	m. Charge refrigeration system.	See Para. 5-9.

5-26. DEHYDRATOR - INSPECT/REPLACE

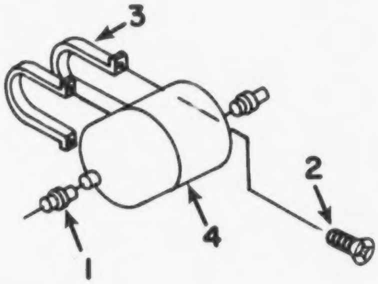
This task covers:

a. Inspect
b. Removal
c. Installation

INITIAL SETUP

Equipment Condition Para	Condition Description
4-17	Rear Top Cover Removed.
5-4	Refrigerant System Discharged

LOCATION/ITEM	ACTION	REMARKS
Right Rear Top Of Housing		
Inspect	Check dehydrator for leaks or damage.	
Removal	**WARNING** Check that power source is disconnected. Check that refrigerant system is discharged. a. Unscrew flare nuts (1) and remove refrigerant lines from dehydrator. b. Remove two screws (2) and straps (3) to to remove dehydrator (4). c. Remove dehydrator (4).	



5-26. DEHYDRATOR - Continued

LOCATION/ITEM	ACTION	REMARKS
Installation	a. Check the direction arrow marked on the dehydrator.	
	b. Position dehydrator (4) between refrigerant lines.	
	c. Tighten flare nuts (1).	
	d. Install straps (3) with screws (2).	
	e. Leak check refrigerant system.	See Para. 5-7.
	f. Evacuate refrigerant system.	See Para. 5-8.
	g. Charge refrigerant system.	See Para. 5-9.
	h. Install top covers.	See Para. 4-17.

5-27. LIQUID INDICATOR - REPLACE

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

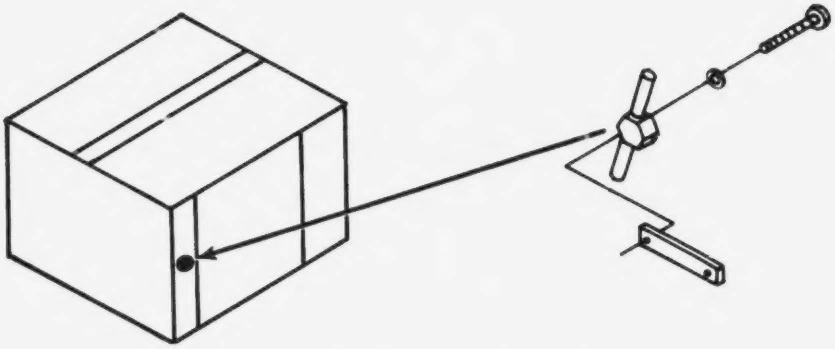
Equipment Condition

Para	Condition Description
4-17	Rear Top Cover removed.
5-4	Refrigerant system discharged.
5-25	Condenser Coil removed.

Materials/Parts

Nitrogen (App.E, Item 4)
Brazing Solder (App.E, Item 5 and 6)
Brazing Flux (App.E, Item 7)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Check that power source is disconnected. Check that refrigerant system is discharged.	
Removal	With a steady flow of dry nitrogen through refrigeration system, debraze liquid sight indicator from condenser coil and attached tubing.	See Para. 5-5. See Para. 5-6.



5-27. LIQUID INDICATOR - Continued

LOCATION/ITEM	ACTION	REMARKS
Installation	a. With a steady flow of dry nitrogen through refrigeration system, braze liquid sight indicator onto condenser coil and tubing.	See Para. 5-5. See Para. 5-6.
	b. Install condenser coil assembly.	See Para. 5-25.
	c. Install dehydrator.	See Para. 5-26.
	d. Leak check refrigerant system.	See Para. 5-7.
	e. Evacuate refrigerant system.	See Para. 5-8.
	f. Charge refrigerant system.	See Para. 5-9.
	g. Install Rear Top Cover.	See Para. 4-17.

5-28. COMPRESSOR - TEST/REPAIR/REPLACE

This task covers:

a.	Test	c.	Repair
b.	Removal	d.	Installation

INITIAL SETUP

Equipment Condition

Para	Condition Description
4-17	Rear and Center Top Covers removed.
5-4	Refrigerant System discharged.
5-25	Condenser Coil removed.

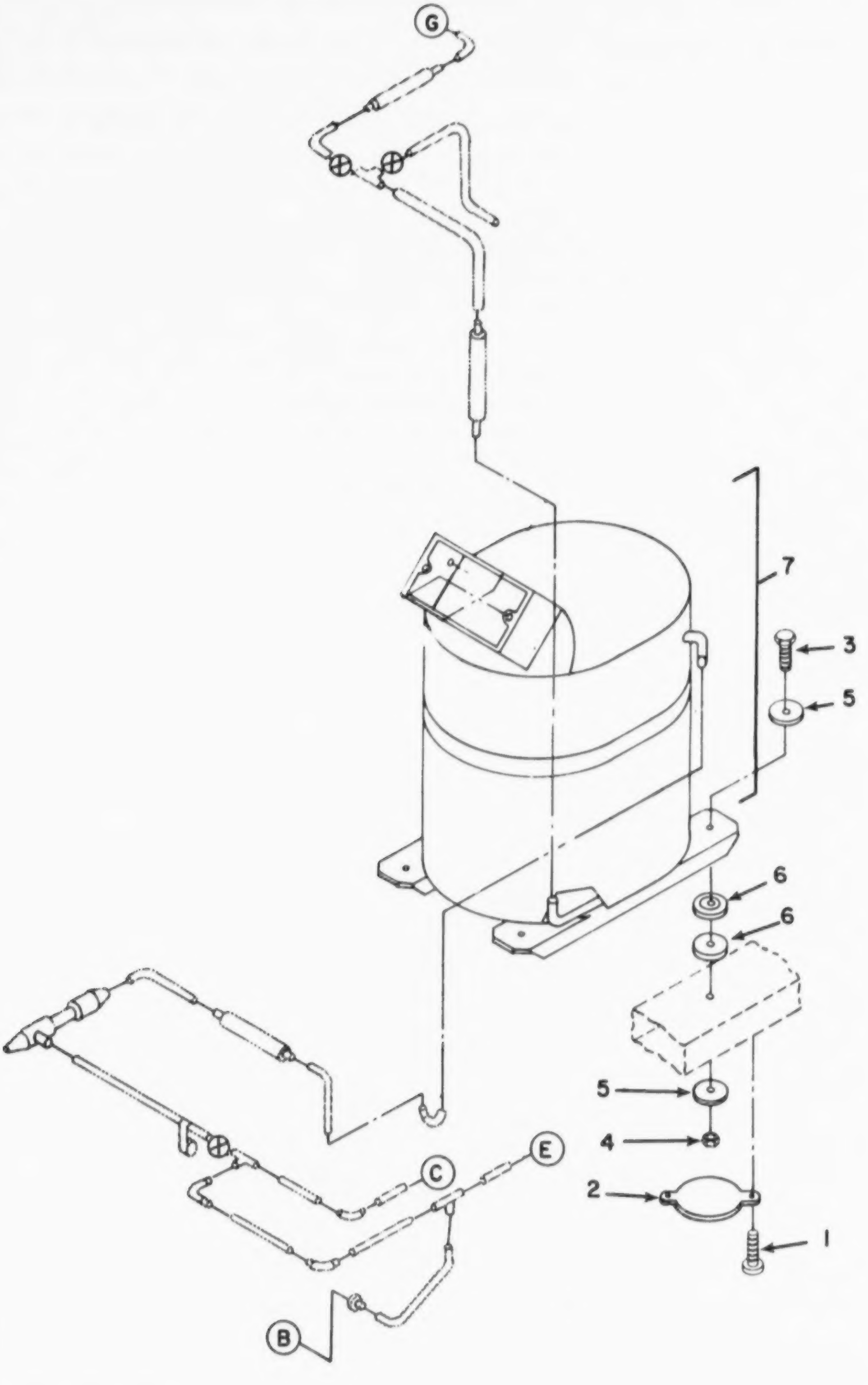
Special Tools

Multimeter or Ohmmeter

Materials/Parts

Nitrogen (App.E, Item 4)
Refrigerant R-22 (App.E, Item 10)
Refrigerant R-11 (App.E, Item 12)
Brazing Solder (App.E, Item 5 & 6)
Brazing Flux (App.E, Item 7)
Clean Glass Container

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power supply before doing maintenance work on the electrical system.	
Test	a. Disconnect the compressor electrical connector plug (P10) (15). b. Using a multimeter, test for continuity between pins A and B, B and C, and C and A of the compressor electrical receptacle (15). Continuity should exist. If not, replace compressor. c. Check for continuity between pins A,B and C and the compressor housing. No continuity should exist. If continuity exists, replace compressor.	See Wiring Diagram FO-1.

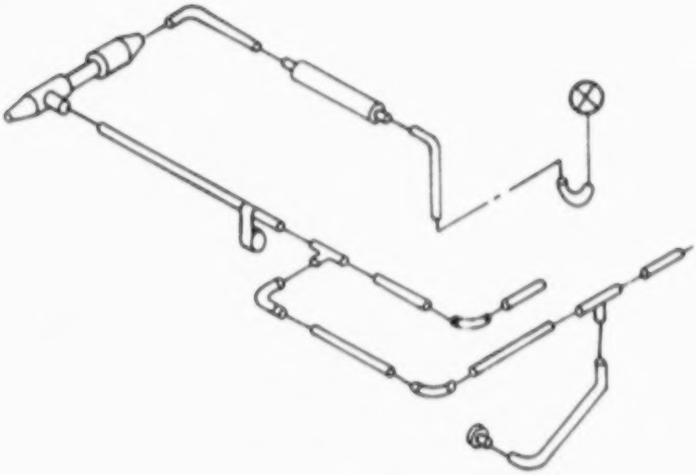

G
C
E
B

5–28. COMPRESSOR – Continued

LOCATION/ITEM	ACTION	REMARKS
Test–Continued	d. Check for continuity between pins D and E. Continuity should exist. If the high temperature thermostat is open, let the compressor cool, then recheck for continuity. If continuity does not exist after allowing the compressor to cool, replace compressor.	
	e. If compressor windings are bad, check for compressor burn–out prior to installing new compressor.	
Removal	a. With dry nitrogen flowing through refrigerant system, debraze tubing from connections (X).	See Para. 5–6.
	NOTE The compressor is mounted to the housing by bolts inserted from the inside of the unit, attaching to locknuts which are inserted from the underside of the unit. Thus, it is necessary that the entire air conditioner be raised and placed on blocks of sufficient height to allow for removal of the locknuts below the base.	
	b. Loosen eight screws (1) and open four access covers (2) on bottom of unit.	
	c. Remove four screws (3), eight flat washers (5) and four self–locking nuts (4) securing compressor (7) to housing.	
	d. Remove compressor wiring harness.	

5-28. COMPRESSOR – Continued

LOCATION/ITEM	ACTION	REMARKS
Removal–Continued	**WARNING** Compressor weighs as much as 55 pounds (25.0 kg) and could cause injury to personnel and damage to equipment if not handled properly while removing from unit.	
	e. Remove compressor horizontally through condenser coil opening at rear of unit.	
	f. Remove eight resilient mounts (6).	
	g. Debraze tubing assemblies from compressor at connections (X).	See Para. 5-6.



5-28. COMPRESSOR – Continued

LOCATION/ITEM	ACTION	REMARKS
Decontamination	After removal of a bad compressor from the refrigeration system, tip the compressor toward the discharge port to drain sample of oil into a clear glass container.	
	WARNING	
	Avoid inhaling fumes and burns from any acid formed by burn out of oil and refrigerant.	
	b. If the oil is clean and clear, and does not have a burnt acid smell, the compressor did not fail because of motor burn out. If a burn out is not indicated, proceed to installing a replacement compressor.	
	c. If [illegible] oil is black, contains sl[illegible] has a burnt acid odor, the compressor failed because of motor burn out.	
	d. You must clean the entire refrigeration system after a burn out has occurred, since contaminants will have been carried to many corners and restrictions in the piping and fittings. These contaminants will soon mix with new refrigerant gas and compressor oil to cause repeated burn outs.	
	e. Remove the dehydrator (filter-drier) and blow down each leg of the refrigeration system. To do this, connect a cylinder of dry nitrogen to each dehydrator connection, in turn, and open the cylinder shutoff valve for at least 30 seconds at 50 PSIG (3.5 kg/cm^2) pressure.	(See Para. 5-26.)

5-28. COMPRESSOR - Continued

LOCATION/ITEM	ACTION	REMARKS
Decontamination–Continued	f. Connect the two dehydrator fittings with a jumper, locally manufactured from refrigerant tubing and fittings. g. Clean system by back-flushing with liquid R-11 from pressurized cylinder or circulating pump and reservoir with pressure of at least 100 psig. h. If pump is used, connect the discharge line of the refriferant system to the discharge side of pump. i. Connect a line containing a filter to the suction line in the unit. NOTE An unused dehydrator or other suitable medium may be used as a filter. j. The other end of the temporary suction line should be connected to a small drum or suitable reservoir. k. A line should be run from the bottom of the reservoir to the inlet of the pump. **WARNING** Avoid inhaling fumes and burns from any acid formed by burnout of oil and refrigerant. Wear a gas mask if area is not thoroughly ventilated. Wear protective goggles or glasses to protect eyes. Wear rubber gloves to protect hands.	

5-28. COMPRESSOR – Continued

LOCATION/ITEM	ACTION	REMARKS
Decontamination–Continued		
	l. Fill reservoir with fluorocarbon refrigerant, R-11, and start the pump. Continue filling the reservoir with refrigerant , R-11, until it begins to pour out of the return line. Continue flushing for at least 15 minutes.	
	m. Reverse the pump connections, replace the filter with a new filtering medium, and back-flush the system for an additional 15 minutes.	
	n. Remove the pump, reservoir, filter, and dehydrator jumper. Place an empty container below the compressor connections, and connect a cylinder of dry nitrogen to each filter-drier connection in turn. Blow down each leg of the system at 50 PSIG (3.5 kg/cm^2) for at least 30 seconds.	
	o. Disconnect the dry nitrogen cylinder. Cap or plug open connections if compressor and filter-drier are not to be installed immediately.	
Repair–Wiring	a. Remove the insulation to expose 1/2 inch/1.27 centimeters of bare wire on each side of break or damaged insulation.	
	b. Insert the ends into a splice-connector; splice, and crimp the connector to make firm electrical contact.	
	c. Alternatively, heat-shrink tubing may be slipped over one end of the wire before splicing, then heated after the splice is made and soldered so as to cover the spliced area.	

5-28. COMPRESSOR - Continued

LOCATION/ITEM	ACTION	REMARKS
Repair-Continued		
	d. Be sure that no bare wire is exposed after the splice is complete.	
	e. Replace broken terminal lugs with exact duplicates.	
	f. To replace electrical connector, unsolder wires from the solderwells of the inserts.	
	g. Insert bare ends of the wires in corresponding holes of new insert, and solder in place.	
	h. Check continuity terminal-to-terminal.	
Installation	a. Install eight compressor resilient mounts (6).	
	b. Install new compressor having a full and proper charge of oil.	
	c. Secure compressor with four screws (3), eight flat washers (5), and four locknuts (4).	
	d. Connect piping. Provide a flow of dry nitrogen through the system to protect inside surfaces of refrigerant piping from scaling while brazing.	
	e. Replace dehydrator.	
	f. Leak test unit.	See Para. 5-7.
	g. Evacuate the system.	See Para. 5-8.
	h. Charge unit with refrigerant R-22.	See Para. 5-9.
	i. Start the air conditioner and operate the unit for 24 hours.	
	j. Discharge system and purge with dry nitrogen.	See Para. 5-4 and Para. 5-5.
	k. Evacuate the system and recharge it with refrigerant R-22.	See Para. 5-8 and Para. 5-9.
	l. Install Rear and Center Top Covers.	See Para. 4-17.

5-29. TUBING & FITTINGS - TEST/REPLACE

This task covers:

- a. Test
- b. Removal
- c. Installation

INITIAL SETUP

Equipment Condition

Para	Condition Description
4-17	Top Covers removed.
5-4	Refrigerant system discharged.

Test Equipment

Halogen Test Detector
Leak Standard

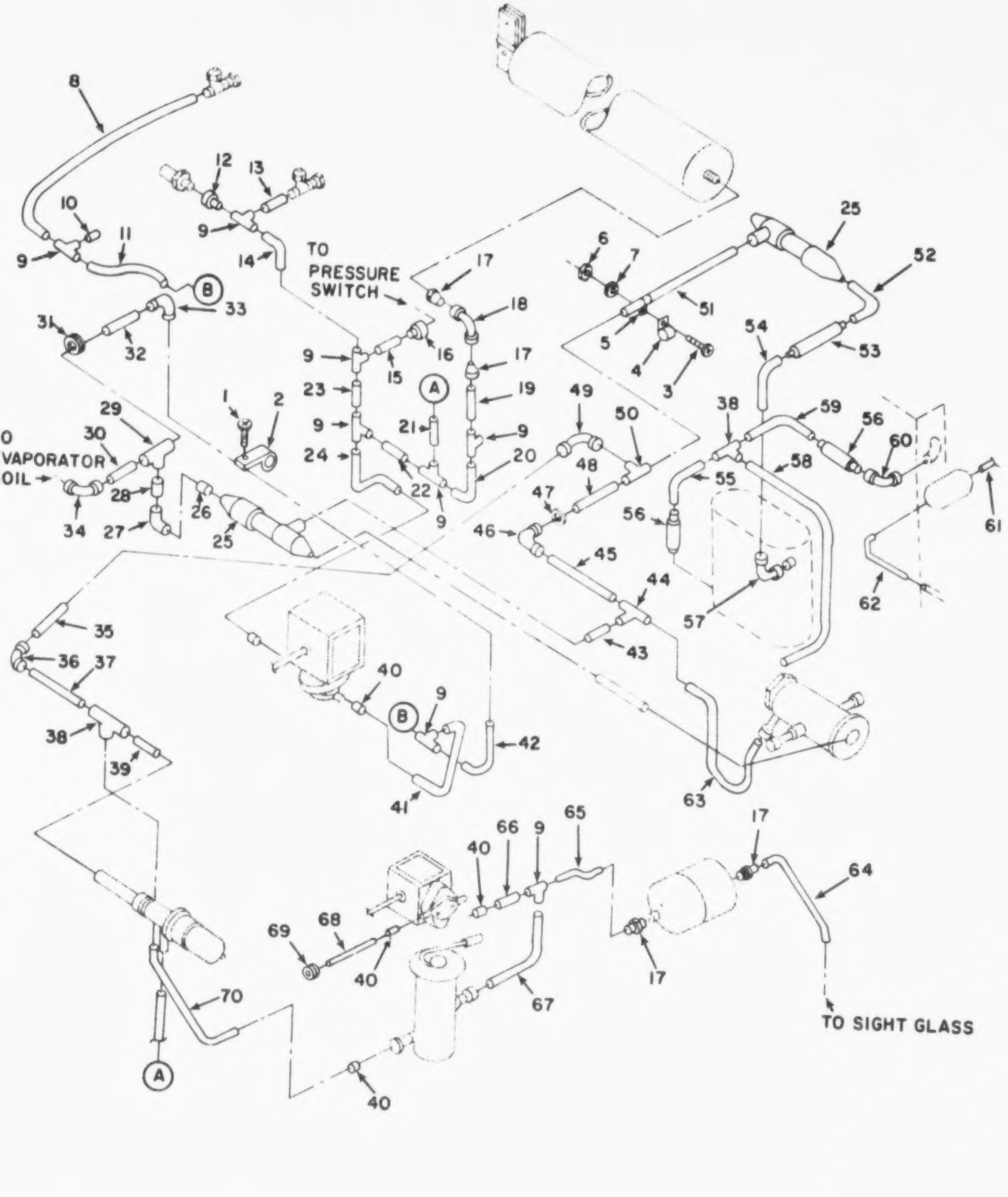
Materials/Parts

Nitrogen (App.E, Item 4)
Brazing Solder (App.E, Item 5 and 6)
Brazing Flux (App.E, Item 7)
Refrigerant-22 (App.E, Item 10)

LOCATION/ITEM		ACTION	REMARKS
		WARNING Disconnect air conditioner power supply before doing maintenance work on the electrical system. **WARNING** Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas. Be especially careful that refrigerant does not come in contact with eyes. In case of refrigerant leaks, ventilate area immediately.	
Test	a.	Check all piping and connections with a General Electric Type H-2 Halogen Test Detector (or approved equal).	

5-29. REFRIGERATION PIPING - Continued

LOCATION/ITEM		ACTION	REMARKS
Test - Continued	b.	Calibrate the detector with a General Electric LS-20 leak standard (or approved equal) for a pure refrigerant leak rate of 0.1 ounce (2.8349 gms) per year.	
	c.	Replace any piping or connection that is leaking beyond rate of 0.1 ounce (2.8439 gms) per year.	
Removal	a.	Debraze and remove tubing only when necessary to remove a defective part.	
	b.	When brazing, constantly purge the refrigerant system with dry nitrogen to prevent scale formation within the refrigerant system.	See Para. 5-6.
Installation	a.	Braze all copper-to-copper joints with silver solder (App.E, Item 21).	
	b.	Braze all copper-to-brass or copper-to-steel with silver solder.	
	c.	Braze melting point is 1160°F (625°C).	
	d.	Make all braze joints with an atmosphere of inert gas to prevent internal oxidation.	See Para. 5-6.
	e.	Service refrigeration system after repairs.	See Para. 5-3 thru 5-10.
	f.	Secure Top Covers.	See Para. 4-17.


TO PRESSURE SWITCH
B
A
TO EVAPORATOR COIL
B
A
TO SIGHT GLASS

CHAPTER 6

GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

SECTION 1. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

6-1. GENERAL INFORMATION

Repair parts are listed and illustrated in TM 5-4120-378-24P. No special tools are required for general support maintenance of the air conditioner. Test, Maintenance, and Diagnostic Equipment (TMDE), and support equipment, includes standard electrical test equipment, and standard pressure and vacuum gages, vacuum servicing manifolds found in any general support maintenance refrigeration facility.

SECTION II. MAINTENANCE PROCEDURES

6-2. HOUSING - REPAIR

This task covers:

a. Removal
b. Inspection
c. Repair/Replace

INITIAL SETUP

Materials/Parts
Adhesive (App.E, Item 18)
Cellular Rubber Strips (App.E, Item 19)
Flexible Polyurethane Foam (App.E, Item 20)
Cloth, Lint free (App.E, Item 9)
Acetone (App.E, Item 22)
Methyl-Ethyl-Ketone (MEK) (App.E, Item 23)
Paint, Forest Green (MIL-C-46168)
Paint Brush
Sandpaper, 240 Grit
Primer (TT-P-1757)

LOCATION/ITEM	ACTION	REMARKS
	WARNING Disconnect air conditioner power supply before doing maintenance work on the electrical system.	
	WARNING Acetone and methyl-ethyl ketone are flammable and their vapors are explosive. Prolonged or repeated inhalation of fumes or contact with the skin can be toxic. Use in a well ventilated area, wear gloves and keep away from sparks or flame.	
Inspection	a. Inspect for damage. Look for loose, frayed, cracked and missing insulation.	

6-2. HOUSING - REPAIR - Continued

LOCATION/ITEM	ACTION	REMARKS
Inspection - (Continued)	b. Visually check for excessive drying of insulation, or shrinkage.	
Removal	a. Scrape and pull off as much of the damaged insulation as possible. b. Soften the remaining insulation and adhesive with acetone or MEK (Methyl-Ethyl-Ketone). c. Repeat the softening and scraping process as required. d. Clean up metal surface with cloth moistened in acetone or MEK.	
Repair-Insulation	a. Repair loose or torn insulation with adhesive. b. Replace frayed, drying, cracked or missing insulation. c. Cut a sheet of the proper insulating material to correct shape. d. Coat the attaching side with adhesive using a paint brush to ensure complete coverage. e. Coat the metal with adhesive to which the insulation is to be attached. f. Let both surfaces air-dry until the adhesive becomes tacky but will not stick to the fingers. g. Starting at one corner or at a narrow edge, carefully bring the insulation into full contact with the metal. h. Press into firm contact all over. i. Allow sufficient time to dry thoroughly before installation.	

6-2. HOUSING - REPAIR - Continued

LOCATION/ITEM	ACTION	REMARKS
Repair- Housing	a. Visually inspect for nicks gouges, dents, bare spots in paint and other defects which can be repaired. b. Repair/replace handles and associated hardware. c. Sand and paint any repaired area in housing, referencing TM 43-0139, Painting instructions for field use. d. Remove minor dents and paint. e. Remove any rust or other minor corrosive damage and paint.	

APPENDIX A

REFERENCES

A-1. SCOPE

This appendix lists all forms, field manuals, technical manuals, and miscellaneous publications referenced in this manual.

A-2. FORMS

Recommended Changes to DA Publications	DA Form 2028-2
Equipment Inspection and Maintenance Work Sheet	DA Form 2404
Quality Deficiency Report	DA Form 368

A-3. FIELD MANUALS

Electric Motor and Generator Repair	FM 20-31

A-4. MANUALS

Hand Portable Fire Extinguishers Approved for Army Users	TB 5-4200-200-10
The Army Maintenance Management System (TAMMS)	DA PAM 738-750
Painting Instructions for Field Use	TM 43-0139
Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List	TM 5-4120-378-24P
Administrative Storage of Equipment	TM 740-90-1
Prevent Enemy Use	TM 750-244-3
Leak Detector, Refrigerant Gas	TM 9-4940-435-14

APPENDIX B

Section I INTRODUCTION

B-1. GENERAL

a. This section provides a general explanation of all maintenance functions authorized at various maintenance categories.

b. The Maintenance Allocation Chart (MAC) in Section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance categories.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referred from Section II.

d. Section IV contains supplementary instructions and explanatory notes for a particular maintenance function.

B-2. MAINTENANCE FUNCTIONS

Maintenance functions will be limited to and defined as follows (except for ammunition MAC[1]).

a. INSPECT. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).

b. TEST. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. SERVICE. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids or grease.

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[1] Exception is authorized for ammunition MAC to permit the redesignation/ redefinition of maintenance function headings to more adequately identify ammunition maintenance functions. The heading designations and definitions will be included in the appropriate technical manual for each category of ammunition.

B-2. MAINTENANCE FUNCTIONS (Continued)

d. ADJUST. To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. ALINE. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. CALIBRATE. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy to the instrument being compared.

g. REMOVAL/INSTALL. To remove and install the same item when required to perform service or other maintenance service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. REPLACE. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the 3rd position of the SMR code.

i. REPAIR. The application of maintenance services, including fault location/troubleshooting, removal/installation, and disassembly/assembly procedures, and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. OVERHAUL. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. REBUILD. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age requirements (hours/miles, etc.) considered in classifying Army equipment/components.

B-3. EXPLANATION OF COLUMNS IN THE MAC, SECTION II

a. COLUMN 1, GROUP NUMBER. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next highest assembly. End item group numbers shall be "00".

b. COLUMN 2, COMPONENT/ASSEMBLY. Column 2 contains the names of components assemblies, subassemblies, and modules for which maintenance is authorized.

c. COLUMN 3, MAINTENANCE FUNCTION. Column 3 lists the functions to be performed on the item listed in Column 2. (For detailed explanation of these functions, see paragraph B-2.)

d. COLUMN 4, MAINTENANCE CATEGORY. Column 4 specifies, by listing of a work time figure in the appropriate subcolumn(s), the category of maintenance, authorized to perform the functions listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate work time figures will be shown for each category. The work time figure represents the average time required to restore an item, (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the Maintenance Allocation Chart. The symbol designations for the various maintenance categories are as follows:

C	Operator or Crew
O	Organizational Maintenance
F	Direct Support Maintenance
H	General Support Maintenance
L	Specialized Repair Activity
D	Depot Maintenance

Services-inspect, test, service, adjust, aline, calibrate, and/or replace.
Fault locate/troubleshoot-The process or investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).
Disassemble/Assemble-Encompasses the step-by-step taking apart (or breakdown) of a spare/functional group coded item to the level of its least componency identified as maintenance significant; (i.e., assigned an SMR code) for the category of maintenance under consideration.
Actions-Welding, grinding, riveting, straightening, facing, remachining and/or resurfacing.

This maintenance category is not included in Section II, column 4 of the Maintenance Allocation Chart. To identify functions to this category of maintenance, enter a work time figure in the "H" column of Section II, column 4, and use an associate reference code in the Remarks column (6). Key the code to Section IV, Remarks, and explain the SRA complete repair application there. The explanatory remark(s) shall reference the specific Repair Parts and Special Tools List (RPSTL) TM which contains additional SRA criteria and the authorized spare/repair parts.

B-3. EXPLANATION OF COLUMNS IN THE MAC, SECTION II (Continued)

e. COLUMN 5, TOOL AND EQUIPMENT. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

f. COLUMN 6, REMARKS. This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks in Section IV.

B-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III

a. COLUMN 1, REFERENCE CODE. The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. COLUMN 2, MAINTENANCE CATEGORY. The lowest category of maintenance authorized to use the tool or test equipment.

c. COLUMN 3, NOMENCLATURE. Name or identification of the tool or test equipment.

d. COLUMN 4, NATIONAL STOCK NUMBER. The National Stock Number of the tool or test equipment.

e. COLUMN 5, TOOL NUMBER. The manufacturer's part number.

B-5. EXPLANATION OF COLUMNS IN REMARKS, SECTION IV

a. COLUMN 1, REFERENCE CODE. The code recorded in column 6, Section II.

b. COLUMN 2, REMARKS. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

SECTION II. MAINTENANCE ALLOCATION CHART

(1) Group No.	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance Level					(5) Tools and equipment	(6) Remarks
			C	O	F	H	D		
01	HOUSING COVERS, PANELS, GRILLES, SCREENS AND INFORMATION PLATES								
	Cover, Canvas	Inspect	0.1						
		Service		0.5					
		Repair			2.0				
		Replace			1.0				
	Panels	Inspect	0.1						
		Service		0.5					
		Repair			2.0				
		Replace			1.0				
	Screens and Guards	Inspect	0.1						
		Service	0.2						
		Replace			0.5				
		Repair			1.0				
	Louvers	Inspect	0.1						
		Adjust	0.1						
		Service		0.1					
		Replace			1.0				
	Information Plates	Inspect	0.1						
		Replace			0.5				
02	AIR CIRCULATING AND CONDENSATE DRAIN SYSTEM								
	Air Filter	Inspect		0.2					
		Service		1.0					
		Replace		0.5					
	Mist Eliminator	Inspect		0.3					
		Service		1.0					
		Replace		0.5					
		Repair		1.0					

SECTION II. MAINTENANCE ALLOCATION CHART - Continued

(1) Group No.	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance Level					(5) Tools and equipment	(6) Remarks
			C	O	F	H	D		
	Condenser Air Discharge Louver and Linkage	Inspect		0.5					
		Service		1.0					
		Adjust		1.0					
		Replace		2.0					
	Fresh Air Damper and Actuator	Inspect		0.5					
		Service		0.5					
		Adjust	0.1	0.5					
		Replace		2.0					
	Condensate Drain Tubes	Inspect	0.1	0.5					
		Service		0.5					
		Replace		1.0					
03	ELECTRICAL SYSTEM								
	Control Module	Inspect	0.1						
		Adjust	0.1						
		Repair		2.0					
		Replace		0.5					
	Temperature Control (Thermostat)	Inspect		0.1					
		Adjust	0.1						
		Test		1.0					
		Replace		1.0					
	Evaporator Fan Speed switch	Inspect		0.1					
		Adjust	0.1						
		Test		0.5					
		Replace		1.0					
	Mode Selector Switch	Inspect		0.1					
		Adjust	0.1						
		Test		0.5					
		Replace		1.0					
	Compressor Circuit Breaker	Inspect		0.1					
		Test		0.5					
		Replace		1.0					
	Control Module Wiring Harness	Inspect		0.5					
		Test		1.0					
		Repair		1.0					

SECTION II. MAINTENANCE ALLOCATION CHART – Continued

(1) Group No.	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance Level					(5) Tools and equipment	(6) Remarks
			C	O	F	H	D		
	Junction Box	Inspect		1.0					
		Repair		2.0					
		Replace		2.0					
	Control Circuit Breaker	Inspect		0.1					
		Test		0.5					
		Replace		1.0					
	Junction Box Wiring Harness	Inspect		0.5					
		Test		1.0					
		Repair		1.0					
		Replace		12.0					
	Relays	Inspect		0.2					
		Test		1.0					
		Replace		1.5					
	Unit Wiring Harness	Inspect		1.0					
		Test		2.0					
		Repair		1.0					
		Replace		4.0					
	Capacitor	Inspect		0.1					
		Test		0.2					
		Replace		0.5					
	Rectifier	Inspect		0.1					
		Test		0.5					
		Replace		1.0					
	Transformer	Inspect		0.1					
		Test		0.5					
		Replace		1.0					
04	EVAPORATOR FAN MOTOR AND HEATER								
	Fan and Housing	Inspect		0.5					
		Replace		1.0					
	Motor	Inspect		0.5					
		Test		0.5					
		Repair			2.0				A
		Replace		3.0					

SECTION II. MAINTENANCE ALLOCATION CHART – Continued

(1) Group No.	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance Level					(5) Tools and equipment	(6) Remarks
			C	O	F	H	D		
	Heater Thermostat	Inspect		0.1					
		Test		1.0					
		Replace		0.5					
	Heater Elements	Inspect		0.4					
		Test		0.5					
		Replace		2.0					
05	CONDENSER FAN, AND MOTOR								
	Fan and Housing	Inspect		0.5					
		Replace		1.0					
	Motor	Inspect		0.5					
		Test		0.5					
		Repair			2.0				A
		Replace		3.0					
06	REFRIGERATION SYSTEM								
	Evaporator Coil	Inspect		0.5					
		Service		1.0					
		Replace			8.0				
	Expansion Valves	Replace			8.0				
	Solenoid Valves	Test		0.5					
		Repair		1.0					
		Replace			8.0				
	Pressure Regulator Valve	Replace			8.0				
	Actuating Cylinder	Inspect			0.1				
		Adjust			1.0				
		Replace			8.0				
	Pressure Switches	Inspect			0.1				
		Test			0.5				
		Replace			8.0				
	Service Valves	Inspect			0.5				
		Replace			8.0				

SECTION II. MAINTENANCE ALLOCATION CHART - Continued

(1) Group No.	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance Level					(5) Tools and equipment	(6) Remarks
			C	O	F	H	D		
	Pressure Relief Valve	Inspect			0.5				
		Replace			8.0				
	Condenser Coil	Inspect		0.5					
		Service		1.0					
		Replace			8.0				
	Dehydrator	Inspect		0.1					
		Replace		3.0					
	Liquid Indicator	Inspect	0.5						
		Replace			8.0				
	Compressor	Test			0.5				
		Repair			1.0				
		Replace			12.0				
	Tubing and Fittings	Test			0.5				
		Replace			8.0				
07	HOUSING								
	Housing	Inspect		0.5					
		Service		0.5					
		Repair				1.0			
08	ACCESSORY/LOOSE ITEMS								
	Connectors	Inspect		0.5					
		Replace		2.0					
	Installation Hardware	Inspect		0.5					
		Replace		1.0					

SECTION III. TOOLS AND TEST EQUIPMENT REQUIRED

(1) REFERENCE CODE	(2) MAINTENANCE LEVEL	(3) NOMENCLATURE	(4) NATIONAL/NATO STOCK NUMBER	(5) TOOL NUMBER
		No special tools and test equipment required. Standard tools and test equipment in the following kits are adequate to accomplish the maintenance functions listed in Section II.		
1	O-F-H	Tool kit, service, refrigeration (SC 5180-90-CL-N18)	5180-00-596-1474	
2	F-H	Pump, Vacuum	4310-00-098-5272	
3	O-F-H	Soldering Gun Kit	3439-00-930-1638	

SECTION IV. REMARKS

REFERENCE CODE	REMARKS
A	Limited Bearing Replacement Other than those items listed above, there are no supplemental instructions or explanatory remarks required for the maintenance functions listed in Section II. All functions are sufficiently defined in Section I. Active time listed for maintenance task functions is with the air conditioner in "OFF" position (power off).

APPENDIX C

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

C-1. SCOPE

This appendix lists components of end item (COEI) and basic issue items (BII) for the air conditioner to help you inventory items required for safe and efficient operation.

C-2. GENERAL

The components of end item and basic issue item lists are divided into the following sections:

a. SECTION II, COMPONENTS OF END ITEM. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. SECTION III, BASIC ISSUE ITEMS. These are the minimum essential items required to place the air conditioner in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, BII must be with the air conditioner during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement BII, based on TOE/MTOE authorization of the end item.

C-3. EXPLANATION OF COLUMNS

The following provides an explanation of the columns found in the tabular listings:

a. COLUMN (1)-ILLUSTRATION NUMBER (Illus Number). This column indicates the number of the illustration in which the item is shown.

b. COLUMN (2)-NATIONAL STOCK NUMBER. Indicates the National Stock Number assigned to the item and will be used for requisitioning purposes.

c. COLUMN (3)-DESCRIPTION. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item idicates the FSCM (in parentheses) followed by the part number.

C-3. EXPLANATION OF COLUMNS (Continued)

d. COLUMN (4)–UNIT OF MEASURE. Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two–character alphabetical abbreviation (e.g., ea, in., pr).

e. COLUMN (5)–QUANTITY REQUIRED (Qty rqr). Indicates the quantity of the item authorized to be used with/on the equipment.

Section II. COMPONENTS OF END ITEM

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION FSCM and PART NUMBER	USABLE ON CODE	(4) U/M	(5) QTY RQR

NONE

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Section III. BASIC ISSUE ITEMS

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) U/M	(5) QTY AUTH
		Department of the Army Technical Manual; Operator's, Organizational, Direct Support and General Support Maintenance Manual TM 5-4120-378-14		
		Department of the Army Technical Manual; Organizational, Direct Support Maintenance Repair Parts and Special Tools List TM 5-4120-378-24P		

APPENDIX D

ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

D-1. SCOPE

This appendix lists additional items you are authorized for the support of the air conditioner.

D-2. GENERAL

This list identifies items that do not have to accompany the air conditioner and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

D-3. EXPLANATION OF LISTING

National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. The items are listed in alphabetical sequence by item name under the type document (i.e., CTA, MTOE, TDA, or JTA) which authorized the item(s) to you.

SECTION II ADDITIONAL AUTHORIZATION LIST

(1) National Stock Number	(2) Description FSCM & Part Number	Usable On Code	(3) U/M	(4) Qty Auth
	Cotton Duct Case		EA	1

APPENDIX E

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

E-1. SCOPE

This appendix lists Expendable Supplies and Materials you will need to operate and maintain the Air Conditioner. These items authorized to you by CTA 50-970, Expendable Items (except Medical Class V, Repair Parts and Heraldic Items).

E-2. EXPLANATION OF COLUMNS

a. COLUMN 1 - ITEM NUMBER. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material.

b. COLUMN 2 - LEVEL. This column identifies the lowest level of maintenance that requires the listed item.

c. COLUMN 3 - NATIONAL STOCK NUMBER. This is the national stock number assigned to the item; use it to request or requisition the item.

d. COLUMN 4 - DESCRIPTION. Indicates the federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parentheses, if applicable.

e. COLUMN 5 - Unit of Measure (UM). Indicates the measure used in performing the actual maintenance function. This measurement is expressed by a two-character alphabetical abbreviation e.g., each (ea), inch (in), pair (pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	O		Silicone Adhesive Sealant RTV General MIL-A-46106, Type I	
2	O		Solder, Lead-Tin, QQ-S-571 Type SN60WRP2	
3	F	3040-00-664-0439	Adhesive, General Purpose, 1 pint container	EA
4	F	6830-00-292-0732	Nitrogen	CY
5	F		Brazing Alloy, Silver, QQ-B-654, Grade O, I, or II	
6	F		Brazing Alloy, Silver, QQ-B-654, Grade III	
7	F	3439-00-640-3713	Flux, Brazing, O-F-499, Type B	
8	F	5350-00-192-5047	Abrasive Cloth	PG
9	F	7920-00-205-1711	Rags	
10	F	6850-00-837-9927	Monochlorodifluoromethane, Technical: w/cylinder 22 lbs. (Refrigerant-22) BB-F-1421 Type 22 (81348)	CY
11	F		Tape PPP-T-60, Type IV, Class I	ROLL
12	F	6830-00-872-5120	Trichloromonofluoromethane Technical: w/cylinder 50 lbs. (Refrigerant-11) BB-F-1421 Type II (81348)	
13	F	8030-00-889-3534	Tape, Antiseize, Polytetrafluorethylene MIL-T-22730, Size I	ROLL
14	F		Lubricating Oil, VV-L-825 Type IV	QT
15	F	3439-01-045-7940	Flux, Soldering, Liquid Rosin Base MIL-F-14256	QT

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST – Continued

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
16	O,F	6850-00-264-9037	Dry Cleaning Solvent P-D-680 (81348)	QT
17	O		Coater, Air Filter, MIL-L-2104 (81348)	
18	H		Adhesive, MMM-A-121	QT
19	H		Cellular Rubber Strips MIL-R-6130 Type I, Grade A	FT
20	H		Flexible Polyurethane Foam (AMS 3570)	SHTS
21	F		Solder, Silver,QQ-S-561, Type 3, 4 or 6A	
22	H		Acetone	PT
23	H		Methyl-Ethyl-Ketone (MEK)	PT
24			Insulation, Sheet, Cellular MIL-I-14511	
25			Plastic Foam, unicellular, sheet form, MIL-P-15280	
26			Adhesive, MMM-A-132, Type I, Class I	
27			Toluolene	
28			Industrial Sealant 800	
29			Acid Swab Brush	

APPENDIX F

DIAGRAMS

F-1. WIRING DIAGRAM

The Wiring List for the air conditioner is shown as follows and wiring foldout (FO-1).

COMPONENT REFERENCE LIST

ELEC. REF. DES.	PART NUMBER	DESCRIPTION
B1	13208E4182-5	COMPRESSOR,RECIPROCATING
B2	13221E9334-1	MOTOR,CONDENSER FAN
B3	13216E6140-1	MOTOR,EVAPORATOR FAN
C1	M39014/05-2661	CAPACITOR,FILTER
C2	13222E9171-3	CAPACITOR,CONDENSER RUN
C3	13222E9171-3	CAPACITOR,EVAPORATOR RUN
C4	13222E9171-2	CAPACITOR,COMPRESSOR RUN
C5	13225E8430-2	CAPACITOR,COMPRESSOR START
C6	13218E6961	CAPACITOR
CB1	13216E6206-1	CIRCUIT BREAKER,COMPRESSOR
CB2	13216E6178-1	CIRCUIT BREAKER,CONTROL
CR1	13216E6223	RECTIFIER,SEMICONDUCTOR DEVICE
E1	MS24693-S50	TERMINAL STUD (CONTROL MODULE GND)
E2	MS24693-S50	TERMINAL STUD (JUNCTION BOX GND)
E3& E4	MS325206-246	TERMINAL STUD (SYSTEM GND)
HR1 thru HR4	13216E6124-1	HEATER ELEMENT
J1& J11	MS3100R-18-11P	CONNECTOR,RECEPTACLE, POWER INPUT
J2	13216E6177	CONNECTOR,RECEPTACLE, JUNCTION BOX
J3	13216E6193-2	CONNECTOR,RECEPTACLE, EVAPORATOR FAN
J4	13216E6193-3	CONNECTOR,RECEPTACLE, COMPRESSOR
J5	13216E6193-2	CONNECTOR,RECEPTACLE, CONDENSER FAN
J6	13216E6193-5	CONNECTOR,RECEPTACLE, POWER INPUT
J8	13216E6193-1	CONNECTOR,RECEPTACLE, SOLENOID VALVE BYPASS
J9	13216E6193-1	CONNECTOR,RECEPTACLE, SOLENOID VALVE EQUALIZER

Figure F-1. Wiring Diagram (Sheet 5 of 6)

COMPONENT REFERENCE LIST-CONTINUED

ELEC. REF. DES.	PART NUMBER	DESCRIPTION
J10	PART OF B1	CONNECTOR,RECEPTACLE, COMPRESSOR
J12	13216E6193-5	CONNECTOR,RECEPTACLE EVAPORATOR AND CONDENSER RUN CAPACITOR
K1	13216E6182	RELAY,TIME DELAY
K2	MS24192D1	RELAY,HEATER
K3	MS27418-2B	RELAY,COMPRESSOR MOTOR
K4	MS27418-2B	RELAY,CONDENSER FAN
K5	13216E6240-2	RELAY,COMPRESSOR START
L1	13216E6158	VALVE,SOLENOID,BYPASS
L2	13216E6158	VALVE,SOLENOID,PRESSURE EQUALIZER
P1	MS3106R-18-11S	CONNECTOR,PLUG,POWER INPUT
P2	13216E6209-2	CONNECTOR,PLUG CONTROL MODULE
P3	PART OF B3	CONNECTOR,PLUG EVAPORATOR FAN
P4	MS3106R-20-15P	CONNECTOR,PLUG,COMPRESSOR
P5	PART OF B2	CONNECTOR,PLUG, CONDENSER FAN
P6	MS3106R-18-11S	CONNECTOR,PLUG, POWER INPUT SWITCH
P8	13216E6173	CONNECTOR,PLUG,SOLENOID VALVE BYPASS
P9	13216E6173	CONNECTOR,PLUG,SOLENOID VALVE EQUALIZER
P10	MS3106R-20-15S	CONNECTOR,PLUG,COMPRESSOR
P12	MS3106R-18-11P	CONNECTOR,PLUG, EVAPORATOR&CONDENSER RUN CAPACITORS
S1	13216E6201-2	SWITCH,ROTARY SELECTOR
S2	13216E6200	SWITCH,TOGGLE
S3	13216E6203	SWITCH,TEMPERATURE CONTROL
S4	13216E6215-3	SWITCH,HIGH PRESSURE CUTOUT
S5	13216E6215-1	SWITCH,LOW PRESSURE CUTOUT
S6	13216E6224	SWITCH,HEATER OUTLET
T1	13221E9117	TRANSFORMER
TB1	13216E6232	TERMINAL BOARD, JUNCTION BOX
TB2	13216E6220-1	TERMINAL BOARD
TB3	13216E6232	TERMINAL BOARD,POWER INPUT

NOTE: TO ENERGIZE THE UNIT FROM THE AUXILIARY POWER INPUT SOURCE (J11). THE LEADS ORIGINATING AND ON TB3-1 AND -2 MUST BE CHANGED TO TB3-4 AND -5, RESPECTIVELY.

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F-2. SCHEMATIC DIAGRAM

The Schematic List for the air conditioner is shown as follows and schematic diagram foldout (FO-2).

COMPONENT REFERENCE LIST

ELEC. REF.DES.	PART NUMBER	DESCRIPTION
B1	13208E4182-5	COMPRESSOR,RECIPROCATING
B2	13221E9334-1	MOTOR,CONDENSER FAN
B3	13216E6140-1	MOTOR,EVAPORATOR FAN
C1	M39014/05/2661	CAPACITOR,FILTER
C2	13222E9171-3	CAPACITOR,CONDENSER RUN
C3	13222E9171-3	CAPACITOR,EVAPORATOR RUN
C4	13222E9171-2	CAPACITOR,COMPRESSOR RUN
C5	13225E8430-2	CAPACITOR,COMPRESSOR START
C6	13218E6961	CAPACITOR
CB1	13216E6206-1	CIRCUIT BREAKER,COMPRESSOR
CB2	13216E6178-1	CIRCUIT BREAKER,CONTROL
CR1	13216E6223	RECTIFIER,SEMICONDUCTOR DEVICE
HR1 THRU HR4	13216E6124-1	HEATER ELEMENT
HR5	PART OF B1	CRANKCASE HEATER
J1 & J11	MS3100R-18-11P	CONNECTOR,RECEPTACLE,POWER INPUT
K1	13216E6182	RELAY,TIME DELAY
K2	MS2419201	RELAY,HEATER
K3	MS27418-2B	RELAY,COMPRESSOR MOTOR
K4	MS27418-2B	RELAY,CONDENSER FAN
K5	13216E6240-2	RELAY,COMPRESSOR START
L1	13216E6158	VALVE,SOLENOID,BYPASS
L2	13216E6158	VALVE,SOLENOID,PRESSURE EQUALIZER
S1	13216E6201	SWITCH,ROTARY SELECTOR
S2	13216E6200	SWITCH,TOGGLE
S3	13216E6203	SWITCH,TEMPERATURE CONTROL
S4	13216E6215-3	SWITCH,HIGH PRESSURE CUTOUT
S5	13216E6215-1	SWITCH,LOW PRESSURE CUTOUT
S6	13216E6224	SWITCH,HEATER CUTOUT
S7	PART OF B2	THERMAL SWITCH
S8	PART OF B1	THERMAL SWITCH
T1	13221E9117	TRANSFORMER
TB3	13216E6232	TERMINAL BOARD,POWER INPUT

NOTE: TO ENERGIZE THE UNIT FROM THE AUXILIARY POWER INPUT SOURCE (J11). THE LEADS ORIGINATING FROM TB3-1 AND -2 MUST BE CHANGED TO TB3-4 AND -5 RESPECTIVELY.

Figure F-2. Schematic Diagram (Sheet 3 of 3)

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Charts Transposed to

End of Volume.

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-25A, Operator's, Organizational, Direct Support and General Support Maintenance requirements for Air Conditioner, Horizontal Compact, 9000 BTU, 50/60 HZ, 1PH (F9000H-1: 115V; F9000H-2: 23V).

☆U.S. GOVERNMENT PRINTING OFFICE : 1989 O - 242-451 (1660)

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

THEN. . JOT DOWN THE DOPE ABOUT IT ON THIS FORM. CAREFULLY TEAR IT OUT. FOLD IT AND DROP IT IN THE MAIL!

SOMETHING WRONG WITH THIS PUBLICATION?

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)
PFC JOHN DOE
COA, 3d ENGINEER BN
FT. LEONARDWOOD, MO 63108

DATE SENT

PUBLICATION NUMBER TM 5-4120-378-14	PUBLICATION DATE 31 Oct 86	PUBLICATION TITLE Air Conditioner Horizontal, Compact, 9,000 BTU/HR 115 Volt Single Phase 50/60 Hertz

BE EXACT. PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
6	2-1 a			In line 6 of paragraph 2-1a the manual states the engine has 6 Cylinders. The engine on my set only has 4 Cylinders. Change the manual to show 4 Cylinders.
81		4-3		Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim - Please correct one or the other.
125	line 20			I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered, so the NSN is wrong. Please give me a good NSN

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
JOHN DOE, PFC (268) 317-7111

SIGN HERE John Doe
JOHN DOE

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DRSTS-M Overprint 1, 1 Nov 80

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*
inches	centimeters	2.540
feet	meters	.305
yards	meters	.914
miles	kilometers	1.609
square inches	square centimeters	6.451
square feet	square meters	.093
square yards	square meters	.836
square miles	square kilometers	2.590
acres	square hectometers	.405
cubic feet	cubic meters	.028
cubic yards	cubic meters	.765
fluid ounces	milliliters	29.573
pints	liters	.473
quarts	liters	.946
gallons	liters	3.785
ounces	grams	28.349
pounds	kilograms	.454
short tons	metric tons	.907
pound-feet	newton-meters	1.356
pound-inches	newton-meters	.11296

To change	*To*	*Multiply by*
ounce-inches	newton-meters	.007062
centimeters	inches	.394
meters	feet	3.280
meters	yards	1.094
kilometers	miles	.621
square centimeters	square inches	.155
square meters	square feet	10.764
square meters	square yards	1.196
square kilometers	square miles	.386
square hectometers	acres	2.471
cubic meters	cubic feet	35.315
cubic meters	cubic yards	1.308
milliliters	fluid ounces	.034
liters	pints	2.113
liters	quarts	1.057
liters	gallons	.264
grams	ounces	.035
kilograms	pounds	2.205
metric tons	short tons	1.102

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C